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VOCATIONAL EDUCATION IN PUBLIC SCHOOLS AS RELATED TO SOCIAL, ECONOMIC, AND TECHNICAL TRENDS.

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THE IMPLICATIONS OF GENERAL TRENDS OF SOCIETY ON THE NATURE OF VOCATIONAL EDUCATION IN HIGH SCHOOL AND THE EXTENT TO WHICH THE VOCATIONAL PROGRAMS OFFERED IN THE STATE OF INDIANA ARE EFFECTIVE IN MEETING NEEDS DEVELOPED FROM THESE TRENDS WERE STUDIED. A LISTING OF MAJOR CONDITIONS AND TRENDS WAS PREPARED. THESE WERE RANKED IN TERMS OF POTENTIAL INFLUENCE ON VOCATIONAL EDUCATION TO FORM A CONTEMPORARY DESIGN, HAVING 10 CHARACTERISTIC TRENDS OF SOCIALLY ADAPTED, VOCATIONAL EDUCATIONAL PROGRAMS WHICH COULD BE USED IN CURRICULUM DEVELOPMENT OR FOR EDUCATIONAL APPRAISAL. THEY WERE THEN USED TO DETERMINE DESIRABLE PURPOSES AND PROCEDURES FOR TWO SPECIALIZED FIELDS IN VOCATIONAL TRAINING, AGRICULTURAL AND INDUSTRIAL EDUCATION, USING A SURVEY SAMPLE OF 84 HIGH SCHOOLS. STATUS SCORES WERE COMPILED FOR EACH SCHOOL IN THESE TWO VOCATIONAL AREAS, AND INTERRELATIONSHIPS WERE DETERMINED AMONG PURPOSES, RESOURCES, AND OPERATIONAL PROCEDURES. THE RELATIONSHIP OF SUCH FACTORS AS SCHOOL SIZE AND EXPENDITURES TO THE STATUS SCORES WAS ALSO STUDIED. THE REPORT CONCLUDED WITH ANALYTICAL SYNTHESES OF CURRENT DIRECTION IN THE PROGRAMS OF VOCATIONAL AGRICULTURE AND INDUSTRIAL EDUCATION AND IMPLICATIONS FOR SOME DESIRED EDUCATIONAL TRENDS. (JH)

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THE ANALYSIS OF TRENDS AND CONCEPTS

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John K. Coster

THE DIVISION OF EDUCATION

Lafayette, Indiana

May, 1960

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PART I

THE ANALYSIS OF TRENDS AND CONCEPTS

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Vocational Education in Public Schools as Related to Social, Economic, and Technical Trends

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FOREWORD

This monograph - "Part I, Analysis of Trends and Concepts" - reports an initial phase of a cooperative research project sponsored by the U. S. Office of Education and Purdue University.

The overall research project of which this is a part is entitled "Vocational Education in Public Schools as Related to Social, Economic, and Technical Trends." The central problem of this research concerns an investigation of the relevance of contemporary social, economic, and technical trends to agricultural and industrial education programs in public secondary schools.

In Part I the research was concerned with the identification of social, economic, and technical trends related to vocational education, and the ranking of the trends in terms of the extent to which these trends should be considered in planning programs of vocational education. Then, too, opinions of a jury of leaders in a number of disciplines who are engaged in a continual study from diverse frames of reference were analyzed with reference to (1) the nature of vocational education, (2) the clientele to be served, (3) the importance of vocational education, and (4) the primary role of the public school in society. The findings in Part I were organized to produce a set of criteria that set forth a position with respect to <u>what should be</u> the characteristics of a socially adapted program of vocational education.

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CHAPTER I

SOCIETY AND THE SCHOOL

One of the persistent problems in American secondary education is that of translating social reality into the educational program. Social changes, particularly if they are extensive, create many curriculum problems for those in charge of schools. When, for example, the progress of science and technology alters a culture from a simple agrarian to a complex industrial society - as has happened within the United States - the school's responsibility for vocational education increases enormously. With this example in mind, the principal theme of this chapter is to present the concept of the relationship that obtains between the society and the school.

I. SOCIAL DIAGNOSIS A BASIS FOR CURRICULUM DEVELOPMENT

If the purpose of the school is to prepare the learner to participate intelligently and helpfully in the society of which he is a part, it follows, naturally, that the curriculum must be grounded in social reality. It is no longer a matter of debate that social facts should be taken into account in planning the school's program. However, this is not to suggest that the school must be a complete mirror of society. It must not be supposed that education is always caught in the firm grip of the present, nor bound by the educational mechanics of the past with no responsibility for the future. Quite the contrary is true. In an age marked by profound social, economic, and technical change, education has a responsibility not only for the present, but also for the future.

It is reasonable, therefore, to assume that members of the teaching profession profitably can attempt to discover what social conditions exist that should be considered in a program of curriculum development, and to indicate what the contemporary society means for education. This viewpoint suggests that the dynamics of educational change are to be found in the contemporary society. Although emphasis is hereby placed on the insistent present, it must be observed that present never stands alone for it contains not only the past, but also images the future.

It is, of course, a hackneyed observation that the contemporary scene is pregnant with change. Yet, a most vivid truth of the new era, as Mead points out, is that "no one will live in the world into which he was born, and no one will die in the world in which he worked in maturity."[1]

[1] Margaret Mead, "Thinking Ahead: Why is Education Obsolete?" Harvard Business Review, 36: 23-30, November-December, 1958.

In such a period the school must guard against merely reflecting the transpiring social, economic, and technical elements of society. If the schools are to be a constructive force in a society marked by rapid change, the teaching profession must prevent the curriculum from becoming a repository of outworn skills, ideals, ideas, and standards. Failure to reckon with social change may result in maintaining educational programs which function so inadequately that the youth would be preparing to take their place in a society that no longer exists.

II. VOCATIONAL EDUCATION AND SOCIETAL CONDITIONS

A review of educational literature suggests at once that the American high school is expected to serve many purposes. Nevertheless, whatever else they do, these schools are expected to assist youths and adults in varying ways to prepare for occupations.

Vocational education is important as an educational goal because occupation is of major importance in people's lives. Preparation for work catches the attention of youth in their teens, inducing them to select, to become proficient in, and to adjust to an occupation. The occupation one follows molds and disciplines his adult life. It soon becomes a primary concern in his life, and it is through an occupation that the individual makes his primary contribution to the welfare of society.

Today, within a new setting distinguished by a complex, changing, industrial society, those responsible for vocational education must seriously ponder the direction and the functions which this field of education has performed and can perform. It is evident that social, economic, and technical changes are occurring which engender changes in the occupational structure of our society. It follows reasonably, then, that efficiency in vocational education is dependent upon the constant re-examination of societal conditions in terms of implication for the direction of its educational programs.

Thus, it becomes the task of vocational educators to keep the educational program up-to-date by redefining goals, reorganizing operations, and acquiring adequate resources, which reflect societal conditions and influence the direction of social development. To accomplish this task the vocational educator must become aware of the significant facts resulting from the social diagnoses made by competent scholars in the social, scientific, and technical disciplines. From the insight gained through an understanding of social, economic, and technical changes, educators will be in a position to appraise current vocational educational programs, and thereby be in a better position to estimate the degree of educational change, if any, which will be required. Failure to do so will result in the continuance of training programs for skills which are disappearing or for occupations which no

longer exist or are dying.

It is not surprising, therefore, to find a great deal of attention centering upon the impact of social changes upon educational programs designed to prepare students for occupational proficiency. The paramount question raised by vocational educators is whether vocational education programs have kept pace with the contemporary social conditions and trends. The research project "Vocational Education in Public Schools as Related to Social, Economic, and Technical Trends" directs its attention to this question. Part I of the study, presented herein, is the starting point of the larger problem under investigation. It deals with the identification of social, economic, and technical trends, and the determination of what trends have implications for vocational education.

III. PRESENTATION OF STUDY

The manner in which this study is to be presented is briefly described as follows:

Chapter II. This chapter deals with the problem and design of the study. The assumptions underlying this aspect of the research appear along with the objectives of the study. The procedures employed in identifying trends, the development of the questionnaire, and the selection of the jury respondents are reported.

Chapter III. This chapter reports the statistical analysis and interpretation of jury response to the extent to which trends should be considered in planning future programs of vocational education. Further, the chapter deals with the statistical analysis and interpretation of jury reaction which indicate that the schools should take action (impede or accelerate) regarding each trend; consideration is also given to the results of the test of significance between action and non-action respondents in the various jury categories.

Chapter IV. This chapter reports jury opinion regarding the nature of vocational education, the clientele to be served, the importance of vocational education, and the role of the school in society.

Chapter V. This chapter will summarize the data and present recommendations based upon the findings.

CHAPTER II

THE PROBLEM AND DESIGN OF THE STUDY

I. THE PROBLEM

In Part I, the central problem of the research was concerned with the identification of social, economic, and technical trends obtained from a thorough search of the literature, and the ranking of the trends in terms of the extent to which these trends should be considered in curriculum planning in vocational education. Further, as an adjunct to the study, opinions were analyzed with reference to (a) the nature of vocational education, (b) the clientele to be served, (c) the importance of vocational education, and (d) the role of the school in society.

Three assumptions underlie this phase of the research. The first assumption is that social diagnosis provides essential information for curriculum planning and direction toward translating social reality into educational purposes. The second assumption is that an analysis of societal conditions will serve as a guide for developing a set of criteria for appraising the extent to which existing programs of vocational education are relevant in terms of the identified social, economic, and technical conditions and trends. The third assumption is that value judgements regarding societal conditions and trends may be quantified, and that resultant quantitative data can be used to establish criteria for appraising educational programs.

II. THE OBJECTIVES

The objectives of Part I of the project entitled "Vocational Education in Public Schools as Related to Social, Economic, and Technical Trends" are stated as follows:

1. To identify contemporary social, economic, and technical trends.

2. To obtain a ranking of the trends in terms of the extent to which these trends should be considered in planning programs of vocational education.

3. To discover what action the school should take, if any, with regard to the trends.

4. To sample opinion with regard to <u>what is now</u> the nature of present programs of vocational education.

5. To sample opinion with regard to <u>what should be</u> the nature of future programs of vocational education.

6. To sample opinion regarding the clientele present vocational education programs are designed to accommodate.

7. To sample opinion regarding the clientele future programs should be designed to accommodate.

8. To sample opinion regarding the importance of present programs of vocational education.

9. To sample opinion regarding the importance of vocational education under desired conditions.

10. To sample opinion regarding what is the existing primary role of the public school in our democratic society.

11. To sample opinion regarding what should be the appropriate primary role of the public school in our democratic society.

III. THE PROCEDURES EMPLOYED IN THE STUDY

The following procedures were employed to complete Part I of the project:

<u>Identification of Trends</u>

To derive a list of contemporary social, economic, and technical conditions and trends related to American society an exhaustive search of the literature was conducted. During the period of library research more than 500 sources were examined. The source material included statistical data drawn from authoritative sources, previously completed research in sociology, education, and economics, and literature which provided a consensus of authorities and deduction regarding the contemporary social, economic, and technical conditions and trends related to American culture.

From this rather exhaustive review of the literature, 125 distinct trends were developed. These trends were then incorporated into a preliminary questionnaire and submitted to groups of advanced graduate students in economics, educational administration, and curriculum development. These students reacted to the trends with regard to their importance to educational planning. The results of this tryout procedure, coupled with the advice of competent socio-

logists, economists, and educators on the Purdue University Staff, led to a revision of the preliminary list of trends. With this advice, and after careful study by the researchers, some of the trend statements were rewritten for clarity, others were dropped because of insufficient supporting data, and still others were eliminated because they did not relate properly to the study under consideration. Eventually, a list of 55 trends was constructed to be placed in the questionnaire used in this study.

Development of the Questionnaire

The questionnaire,[1] designed to gather data for Part I of the study, was divided into three sections: Section I, Analysis of Trends; Section II, Questions Regarding Vocational Education; and Section III, Personal Data.

In Section I of the questionnaire the 55 identified trends were ordered randomly. The respondents to the questionnaire were asked to react to two questions regarding each trend. The questions to be considered were:

1. To what extent should each trend be considered in planning future programs of vocational education?

2. How should the public school react with regard to each trend?

For each of the questions, response categories were established to obtain the judgement of the respondents.

In Section II of the questionnaire the respondents were asked to react to eight questions regarding vocational education. The questions were included to help establish, at least in part, the frame of reference against which respondents reacted to the aspects of the study dealing with relevance of trends and the direction the school should take with regard to these trends. These questions were as follows:

1. What is the nature of programs of vocational education as currently practiced in our high schools?

2. What do you believe should be the nature of future programs of vocational education in our high schools?

3. What most nearly describes the clientele current programs of vocational education are designed to accommodate in our high schools?

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[1] A copy of the questionnaire is included in this report as App. A.

4. What groups of students do you believe future programs of vocational education should be designed to accommodate in our high schools?

5. How do you evaluate the importance of vocational education as it is currently operated in our public schools?

6. How would you evaluate the importance of vocational education (based upon answers to questions 3 and 4) as it should be operated in our public schools?

7. What is the existing primary role of the public school in our democratic society?

8. What should be the role of the public school in our democratic society?

For each of these questions response categories were developed to obtain the judgement of the respondents. These response categories are shown in the questionnaire in Appendix A.

Section III was included to collect information regarding the respondents' employment, nature of work, and level of schooling attained.

Selection of Jury Respondents

The respondents selected to react to the questionnaire were regarded as a jury of specialists. The potential jury sample was drawn from a list of leaders in a number of disciplines who are engaged in a continual study of society from diverse frames of reference. The jury of specialists included economists, sociologists, philosophers of education, vocational educators, and personnel in labor and management.

In selecting the jury, 756 persons representing the above mentioned disciplines were invited to serve as respondents to the questionnaire. Of this number, 492 persons agreed to participate as jury members. Questionnaires were mailed to 492 people who agreed to serve as jury members, and two weeks later follow-up reminders were sent. Of this total, 450 persons submitted their responses to the questionnaire in time to be included in the study.

In Table I which follows the reader will find categories of jurors together with the number of jurors participating in Part I of the research project entitled "Vocational Education in Public Schools as Related to Social, Economic, and Technical Trends."

TABLE I

SUB-JURY CATEGORIES AND NUMBER OF JURORS RESPONDING TO QUESTIONNAIRE

Sub-Jury Category	No. Asked To Serve	No. Agreeing To Serve	No. of Returns rec'd	No. of Usable Returns Part I*	No. of Usable Returns Part II**
Economists[2]	100	54	48	47	48
Sociologists[2]	100	60	49	45	49
Educational Philosophers[3]	137	84	75	73	75
Vocat.onal Teacher Trainers[4]	267	218	213	205	200
Management Personnel[5]	100	51	45	44	45
Labor Personnel[6]	52	23	20	16	20
Totals	756	490	450	430	437

[2]Potential jury selected randomly from Jacques Cattell, American Men of Science: The Social and Behavioral Sciences, Vol. III, New York: R. R. Bowker Co., 1956.

[3]Total membership of Philosophy of Education Society.

[4]All head teacher trainers in agriculture, distributive education, homemaking, and industrial education - as listed by the U. S. Office of Education, Vocational Division.

[5]Jury selected randomly from Management Members of Industrial Relations Council.

[6]All labor members of Industrial Relations Council.

*Part I, Trend Analysis

**Part II, Opinions Regarding Vocational Education

CHAPTER II SUMMARY

In Section I of the questionnaire, devoted to the analysis of trends, it was essential that each jury member react to each trend item if the return was to be usable in establishing the rank order of the listed trends. If a jury member did not react to each trend item, or the given response was not clearly legible, the questionnaire was eliminated from this part of the analysis. A total of 20 questionnaires are eliminated. Thus, the findings for Section I of the questionnaire are based upon 430 usable questionnaires.

In Section II of the questionnaire devoted to questions regarding vocational education, all 450 returns were usable since it was not essential to have reactions to all of the questions listed. However, thirteen jury members, the Vocational Distributive Education Teacher Trainers, were excluded because the size of the group was inadequate to provide the expected frequencies necessary when using the chi-square technique to test significant differences of sub-groups within the total jury sample. This action reduced the total number of jury members to 437.

CHAPTER III

ANALYSIS OF TREND DATA AND OPINIONS ON ACTION TO BE TAKEN

Chapter III reports the results of quantitative analysis of value judgements expressed by the jury of specialists with regard to (1) the extent to which identified social, economic, and technical trends should be considered in planning future programs of vocational education, and (2) how the school should react to each identified trend. Specific objectives treated in this chapter are as follows:

1. To determine the rank order the 430 jury specialists would assign to the 55 identified trends in terms of importance to planning future programs of vocational education.

2. To ascertain if there were variations among the several sub-jury groups included in the total sample with regard to average ratings and rank order of average ratings of the 55 trends.

3. To discover whether the opinions held regarding the relevance of each trend to planning future programs of vocational education differ among various sub-jury groups of respondents.

4. To determine jury opinion on what action, if any, the school should take with regard to each identified trend.

5. To discover whether the opinions held concerning action to be taken with regard to each trend differ among various sub-jury groups of respondents.

I. ANALYSIS OF TREND DATA

This phase of the problem dealt with the assigning of a series of scores to the 55 trend items of the questionnaire so that the resultant quantitative hierarchy represents the rank order of relevance of these trends for planning future programs of vocational education, and also, that the subsequent scores are amenable for statistical treatment. The procedure essentially involved the quantification of opinion data, and involved three major steps: (1) the collection of data, (2) the derivation of trend scores, and (3) the statistical treatment of the data.

The Collection of Data

The list of 55 identified social, economic, and technical trends, the preparation of which was discussed in Chapter II and appears in Appendix A, was used to obtain the data for this phase of the study. The composition of the 430 member jury rating these trends has been described in Chapter II.

Jury members were instructed to read each trend carefully, and respond to the basic question: To what extent should each trend be considered in planning future programs of vocational education? The jury members were asked to express their judgment by selecting one of five possible responses:

1. No Extent: Trend is irrelevant and need not be considered in planning vocational programs. (Acquires a value of one.)

2. Limited Extent: Trend is of little importance and should receive only minor consideration. (Acquires a value of two.)

3. Moderate Extent: Trend is of average importance and should receive reasonable consideration. (Acquires a value of three.)

4. Considerable Extent: Trend is quite important and should receive major consideration. (Acquires a value of four.)

5. Very Great Extent: Trend is extremely important and should receive maximum consideration. (Acquires a value of five.)

The response category selected by a jury member was taken, therefore, to be an expression of a value judgment relative to interpreting societal conditions as related to planning vocational programs.

The Derivation of Trend Scores

Scores were assigned to each of the 55 trends by summing the quantitative value of the ratings assigned to each trend by each juror. The total scores assigned to each item are shown in Table II.

The reliability of the scoring procedure was determined by an internal consistency procedure of estimating test reliability

TABLE II

FIFTY-FIVE TRENDS LISTED IN DESCENDING RANK ORDER, BASED ON RATINGS OF 430 RESPONDENTS

Rank	Item No.	Total Score	Trend
1.	8	1924	The ratio of occupations requiring specialized training to occupations requiring little or no training is increasing.
2.	3	1879	The number of years youth spend in education prior to entering the labor force is increasing.
3.	23	1864	The number of new occupations resulting from technological developments in business, industry, and agriculture is increasing.
4.	45	1820	The demand for persons with education beyond the high school level is increasing.
5.	52	1807	The ratio of persons in the labor force employed as craftsmen (skilled), operatives (semi-skilled), and technicians to persons employed as unskilled laborers is increasing.
6.	24	1783	The percentage of adults enrolled in educational programs in public schools is increasing.
7.	4	1780	Expenditures for research and development in agriculture and industry are expanding rapidly.
8.	13	1774	The number of terminal education programs involving two years of post high school education is increasing.
9.	17	1763	The percentage of students in public secondary schools enrolled in vocational education programs is increasing.
10.	29	1715	The range of occupations in which women are employed is increasing.

TABLE II (Continued)

Rank	Item No.	Total Score	Trend
11.	46	1714	American colleges and universities are becoming more selective with regard to admission policies.
12.	34	1701	Training programs in industry designed to prepare, upgrade, and retrain persons for employment are increasing.
13.	26	1691	The ratio of the number of persons engaged in processing, distributing, and providing services to the number of persons engaged in production is increasing.
14.	43	1680	The average number of years of schooling completed by adults in the total population is gradually increasing.
15.	11	1670	The percentage of persons in the labor force employed in supervisory, managerial, and professional positions is increasing.
16.	32	1654	Persons over 45 years of age are experiencing increasing difficulty in obtaining employment.
17.	55	1647	Rapid social, economic, and technological changes in American society are engendering increased uncertainty in personal values and social direction.
18.	19	1641	The agricultural and industrial productivity of the nation gradually is being concentrated into a relatively small number of units of production.
19.	53	1639	Specialized training and employment opportunities for handicapped persons are increasing.
20.	7	1626	The ratio of the number of persons employed by corporations, institutions, and other persons to the number of self-employed persons is increasing.
21.	33	1619	The number and percentage of women, especially married women, in the total labor force is increasing.

TABLE II (Continued)

Rank	Item No.	Total Score	Trend
22.	22	1604	The incidence of diseases and disorders of a psychological or emotional origin is increasing and is receiving more attention as a major health problem in America.
23.	42	1598	The management of agricultural and industrial productivity is being shifted gradually from owners to managerial persons.
24.	18	1587	Expenditures for and participation in leisure time and recreational activities are increasing.
25.	21	1582	Management is becoming increasingly concerned about the physical, mental, and emotional welfare, physical comfort, and safety of the employee.
26.	25	1575	The schools are performing and accepting major responsibilities for an increasing number of functions which formerly were vested with the home, church, and other agencies.
27.	51	1560	The American people are becoming increasingly conscious of problems and practices pertaining to health and safety.
28.	12	1558	The number of occupations for which licenses or certificates are required is increasing.
29.	6	1552	Differences in social and economic characteristics of rural and urban groups are diminishing.
30.	54	1546	Individuals are becoming increasingly more dependent on secondary (second-hand) media of communication as sources for interpretation of information.
31.	31	1528	The American people are becoming increasingly security conscious and are participating more extensively in plans for pensions, health and life insurance, and social welfare programs provided by industry and government.

TABLE II (Continued)

Rank	Item No.	Total Score	Trend
32.	50	1514	The range and scope of family activities and occupational opportunities (due in part to increased units of private transportation) are expanding.
33.	39	1512	Geographical mobility is increasing for highly educated workers.
34.	5	1503	America is moving progressively toward a homogeneous "middle class" society.
35.	38	1502	The percentage of the labor force in farming is declining.
36.	30	1498	The percentage of persons in the labor force who are employed on a second job, either part-time or full-time, is increasing.
37.	9	1490	The percentage of persons in the labor force who are members of organized labor unions is increasing.
38.	28	1483	The percentage of youth who serve in military service prior to entering the labor force is increasing.
39.	44	1480	Interest in and acceptance of improved dietary practices and higher levels of nutrition (e.g., high protein diet, vitamins, calorie content) are increasing.
40.	48	1475	The social and economic life of the nation is becoming more centralized, standardized, and organized into formal patterns.
41.	1	1473	Purchasing habits of the American people are changing with the use of credit buying and long-term payments increasing.
42.	20	1468	The percentage of the population classified as "rural-non-farm" is increasing.
43.5	16	1463	The percentage of the total national income received by agriculture is declining.

TABLE II (Continued)

Rank	Item No.	Total Score	Trend
43.5	49	1463	The ratio of disposable income to total income is declining, with taxes taking a higher percentage of total income.
45.	41	1459	The utilization of synthetic products, low-grade materials, and by-products is increasing.
46.	40	1449	Interest patterns of family members are becoming increasingly varied and oriented toward groups and activities outside the home.
47.	10	1440	The percentage of the population dependent upon incomes from pensions, annuities, and Social Security is increasing.
48.	35	1419	The number of persons over 65, who are not gainfully employed, is increasing.
49.	37	1416	The political life of the nation is becoming more centralized and organized into formal bureaucratic patterns.
50.	36	1413	Sources of value patterns of American people are changing from foundations in eternal value to foundations in social usage.
51.	15	1393	The proportion of land used for purposes other than farming (e.g., transportation, industry, and recreation) is increasing.
52.	47	1298	Secondary groups (e.g., lodges, clubs, and unions) are becoming increasingly important to individuals, and are claiming a larger share of individual time, energies, and loyalties.
53.	27	1288	The percentage of the total income received by the middle 80 per cent of income recipients is increasing slightly.
54.	14	1227	The center of population is shifting toward western and southwestern regions of the United States.
55.	2	962	The percentage of the total population claiming affiliation with a religious organization is increasing.

for unrestricted item scoring methods by analysis of variance.[1] The sum of the squares between items was 3731.89, and, with 54 degrees of freedom, the mean square (MS_I) was 69.1091. The residual or error sum of squares was 17264.94, and, with (55-1) (430-1) or 23166 degrees of freedom, the mean square (MS_E) was 0.7454. The reliability coefficient was determined by the formula

$$r_{tt} = (MS_I - MS_E) / MS_I,$$

which, in this instance was (69.1091 - 0.7454) / 69.1091, or .989.

A reliability coefficient of .989 is sufficiently high to denote that the error variance is minimal, and that ratings were applied with a high degree of consistency. The efficacy of the rating-scoring procedure was examined further by applying an F test to the null hypothesis to the effect that random ratings were assigned to trend items. Using the formula $F = MS_I / MS_E$, and substituting 69.1091 / 0.7454, the value of F was computed as 92.71. With 54 and 23166 degrees of freedom, the hypothesis was rejected[2] at the .1 per cent level of significance. The results of these tests indicated that there was practically no possibility that random ratings were assigned to trend items, but, rather, that systematic judgment was exercised in selecting response categories.

To determine the extent to which confidence may be placed on the rank order of the trends, as listed in Table II, the least significant difference between any two totals (i.e., scores) was computed. The estimate of the variance of any one total is N (MS_E), or 430 x 0.7454, or 320.522, and the estimate of the variance of the difference between any two totals is (2) (N) (MS_E), or 641.044. The standard error of the difference between any two totals, therefore, is 25.319. The least significant difference between any two totals, at the 5 per cent level of significance, is 1.96, the critical value of t, times 25.319, the standard error, or 49.625. Table II shows the scores for the trends, ranked in descending order of importance. Inspection of the scores reveals the points where trend scores differed significantly. Trend No. 8, ranked first, did not differ from Trend No. 3, ranked second. But, Trend No. 8 scored significantly higher than trends ranked third or lower. The score of the lowest ranking trend, Trend No. 2, was significantly lower than any other trend.

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[1] C.J. Hoyt and C.L. Stunkard, "Estimation of Test Reliability for Unrestricted Item Scoring Methods," Educational and Psychological Measurement, 12:756-8, Winter, 1952.

[2] The standard for rejecting a null hypothesis used throughout this study was set at the 5 per cent level of significance.

The results of the foregoing analyses confirmed the adequacy of the scaling procedures. Not only was the reliability coefficient found to be extremely high, but, of equal importance, evidence was obtained which indicated that the jurors attacked the problem of assigning quantitative values to items systematically. Moreover, the scores assigned to individual trend items varied to the extent that there was little or no likelihood that the jury, as a group, believed that the trends should be accorded equal importance in planning future programs of vocational education. These findings, therefore, indicated that the ranked order of the trends, as shown in Table II, could be accepted as the judgment of the total jury as to the relative importance of the trends in planning future programs of vocational education.

Intercorrelations Between Sub-Jury Groups

Both product moment and rank order correlation coefficients were computed between the scores and ranks assigned to trends by various combinations of the six major sub-jury groups. The product moment intercorrelation coefficients for the six sub-juries listed in Table I - economists, sociologists, vocational educators, educational philosophers, management personnel, and labor personnel - are listed in Table III. The coefficients in Table III are based on total scores assigned to items by each group.

TABLE III

INTERCORRELATIONS OF AVERAGE RATINGS OF 55 TRENDS AMONG SIX SUB-JURY GROUPS OF RESPONDENTS

No.	Group Name	1	2	3	4	5	6	T	Size of Group
1	Economists		.92	.90	.88	.89	.84	.96	47
2	Sociologists			.92	.87	.84	.82	.95	45
3	Philosophers				.85	.86	.78	.94	73
4	Vocational Educators					.79	.81	.97	205
5	Management						.73	.89	44
6	Labor							.86	16
T	Total								430

Average r (excluding total) .854

The data indicate that the intercorrelations between scores assigned by pairs of groups ranged from .73 to .92, and the correlations between each sub-jury and the total jury ranged from .86 to .97. Hypotheses to the effect that the true correlation coefficient was zero for each coefficient shown in Table III were all rejected at the .1 per cent level of significance. For 53 degrees of freedom, a coefficient of .43 is sufficiently high for significance at the .1 per cent level. Fudicial limits were computed for an r of .73 with N = 55. At the 5 per cent level of significance the limits are .57 to .83; thus, the possibility that the true coefficient of any of the intercorrelations was less than .57 was rejected. It may be concluded, therefore, that the six sub-jury groups were in substantial agreement insofar as agreement may be determined by product moment correlations of scores assigned by each sub-jury.

Rank order correlation coefficients between the several sub-juries and between each of the sub-juries and the total jury were computed, and the coefficients are shown in Table IV. No coefficient derived from the correlations between two sub-juries was less than .72, and no coefficient derived from the correlations between the total jury and each sub-jury was less than .85. Fudicial limits for a rank order coefficient of .72, with N = 55 are .56 to .83, thus indicating that a hypothesis to the effect that the true coefficient was less than .56 could be rejected at the 5 per cent level of significance. The data in Table IV substantiate the conclusion of basic agreement among sub-juries formulated on the basis of the data in Table III.

TABLE IV

INTERCORRELATION OF RANK ORDER OF AVERAGE RATINGS OF 55 TRENDS AMONG SIX SUB-JURY GROUPS OF RESPONDENTS

Group No.	Name	1	2	3	4	5	6	T	Size of Group
1	Economists		.89	.89	.86	.86	.85	.96	47
2	Sociologists			.88	.83	.82	.82	.92	45
3	Philosophers				.79	.88	.77	.92	73
4	Vocational Educators					.76	.73	.94	205
5	Management						.72	.88	44
6	Labor							.85	16
T	Total								430

Evidence of Agreement Among Sub-Juries Regarding Relevance of Trends for Future Planning

Two series of statistical tests were conducted to analyse the extent of agreement among sub-jury groups pertaining to each of the 55 trends. In one series of tests, fifty-five null hypotheses were formulated to the effect that there was no difference in the ratings assigned to a trend item among three vocational education sub-juries, including agricultural educators, homemaking educators, and industrial educators. In the second series of tests, a similar number of hypotheses were formulated to the effect that there was no difference among eight sub-jury groups. The eight groups included the five non-vocational education sub-juries and the three forementioned vocational education sub-juries.

The Chi-square test of independency in contingency tables was used to test the hypotheses. In determining whether proportions were independent of the sub-jury to which a juror belonged, the frequencies of responses to each item were grouped into three categories: no extent-limited extent (responses 1 and 2), moderate extent (response 3), and considerable extent-very great extent (responses 4 and 5). The per cent of respondents in each of the three categories, and the results of tests of significance are shown in Appendix B, Part A.

The results of the Chi-square tests are summarized in Table V. For the three vocational groups, the null hypothesis was rejected for 27 of the 55 trends. Further analyses of the data revealed that of the items which ranked twentieth or higher, hypotheses were rejected for only five items. Of the remaining 35 items, which ranked twenty-first or lower, twenty-two hypotheses were rejected. These differences in proportions are significant, according to a Chi-square test of independency, thus supporting a conclusion that extent of agreement among the three vocational education sub-juries is related to the relative importance of the trends. As the trends diminish in importance, the incidence of disagreement among the groups with regard to ratings assigned to items tended to increase. Additional information supplied in Part A of Appendix B indicates that where differences occurred, the vocational home-making sub-jury, as a group, tended to rate the items higher than did either the vocational agriculture or industrial education sub-juries, as groups of raters.

The data in Table V also show that for the eight sub-juries, null hypotheses were rejected for 39 of the 55 items at the 5 per cent level of significance or higher. The same pattern of differences that was obtained for the three vocational education sub-juries prevailed for the eight sub-juries. Of the 20 trends ranked

TABLE V

RESULT OF TEST OF SIGNIFICANCE FOR THREE SUB-JURY GROUPS OF VOCATIONAL EDUCATORS AND FOR THE EIGHT SUB-JURY GROUPS OF THE TOTAL JURY REGARDING EXTENT TO WHICH TRENDS SHOULD BE CONSIDERED IN PLANNING FUTURE PROGRAMS OF VOCATIONAL EDUCATION*

Trend Rank	Item No.	Vocational Educators Including Agricultural Educators Homemaking Educators Industrial Educators	Total Jury Including Eight Sub-Jury Groups
1	8	NS	NS
2	3	NS	NS
3	28	NS	NS
4	45	.05	.01
5	12	NS	NS
6	24	NS	.001
7	4	.05	.05
8	13	NS	NS
9	17	NS	NS
10	29	.001	.001
11	46	NS	NS
12	34	NS	.001
13	26	NS	NS
14	43	.05	.05
15	11	NS	NS
16	32	NS	NS
17	55	.01	.05
18	19	NS	.05
19	53	NS	NS
20	7	NS	NS
21	33	.001	.001
22	22	NS	.001
23	42	NS	NS
24	18	.05	.001
25	21	NS	.001
26	25	NS	NS
27	51	.01	.001

*See Appendix B, Part A, for complete statistics.

TABLE V (Continued)

Rank	Trend Item No.	Vocational Educators Including Agricultural Educators Homemaking Educators Industrial Educators	Total Jury Including Eight Sub-Jury Groups
28	12	NS	.05
29	6	.05	.001
30	54	.001	.05
31	31	.05	NS
32	50	.01	.001
33	39	NS	.001
34	5	.01	.001
35	38	NS	.001
36	30	NS	.001
37	9	NS	.01
38	28	.01	.01
39	44	.001	.001
40	48	.01	.01
41	1	.001	.001
42	20	NS	.001
43.5	16	NS	.001
43.5	49	.05	.001
45	41	.05	.001
46	40	.001	.001
47	10	.001	.001
48	35	.05	.001
49	37	NS	NS
50	36	.001	.001
51	15	.01	.001
52	47	.001	.001
53	27	.001	.001
54	14	NS	.001
55	2	.05	.05

highest, hypotheses were rejected for only eight items. Of the remaining 33 trends, hypotheses were rejected for 31 items. These differences in proportions for rejection and non-rejection were statistically significant, according to the result of a Chi-square test of independency. Again it would appear that differences in ratings assigned to items tended to become greater as the relative importance of the trend, as determined by the total score, diminished.

II. OPINIONS ON ACTION TO BE TAKEN

Having been asked to express judgment on the relevance of each trend item for planning future programs of vocational education, the respondents were asked to consider a second question: How should the public school react with regard to each trend? The second question is an important corollary of the first question. Important as it is to discover expert opinion on the relevance of trends for educational planning, it is, likewise, judicious to obtain opinion as to the direction or action to be taken by the school with regard to the relevant trends.

In answering the second question the respondents were requested to make a judgment concerning the desirability of each trend item in terms of potential influence on American society. Then, assuming that the school could participate effectively in the direction of society through the curriculum, the respondents were to indicate the action, if any, the school should take with regard to the direction of each trend item. Four response categories were provided:

1. Impede. This trend is inconsistent with the best interests of American society, and schools should develop programs to discourage, decelerate, depress, and hinder the progress of the trend.

2. Accelerate. This trend is highly consistent with the best interests of American society, and the schools should develop programs to encourage, strengthen, promote, and extend the progress of the trend.

3. Neither Impede nor Accelerate. (Adjust to) This trend is recognized, and the schools should develop programs to adapt, fit, and adjust to the trend without purposely influencing direction.

4. Disregard. The nature of the trend is such that the schools may disregard it in planning educational programs.

The Summary of Responses to Action Categories

The reactions of the eight sub-jury groups -- economists, sociologists, educational philosophers, management personnel, labor personnel, agricultural educators, homemaking educators, and industrial educators -- to the question of action of the schools are presented in detail in Part B of Appendix B. The data in Part B of Appendix B are summarized in this sub-section.

Summary of responses of the total jury. The opinions of the total jury relative to action of the schools for each trend are summarized in Table VI. Table VI shows the per cent of the total jury selecting each response category for each trend. Preliminary examination of the figures in this table reveals wide variation in the per cent of respondents selecting each category. To a great extent, it would appear, each trend should be considered independently in planning a course of action for a school to follow. Closer study of these data, however, suggests four broad generalisations:

1. The great majority of respondents did not believe that these trend items could be disregarded in planning educational programs.

2. With certain obvious exceptions, the percentage of disregard responses tended to increase markedly as the trend items descended in rank order.

3. With certain obvious exceptions, the percentage of adjust to responses tended to increase as the trend items descended in rank order.

4. With certain obvious exceptions, the percentage of accelerate responses tended to decrease as the trend items descended in rank order.

A comparison between action and non-action responses among the eight sub-juries. A series of 55 null hypotheses was formulated to the effect that the proportion of respondents who indicated that the school should take action (impede or accelerate), as compared with the proportion indicating non-action (adjust to or disregard), was independent of the sub-jury group to which the respondent belonged. The results of the tests of hypotheses, together with the per cent of respondents in each sub-jury group who indicated that the school should take action, are shown in Table VII.

The hypotheses were tested by the Chi-square test of independency in contingency tables. Of the 55 hypotheses tested,

TABLE VI

PER CENT OF RESPONDENTS WHO INDICATED THAT SCHOOLS SHOULD IMPEDE, ACCELERATE, ADJUST TO, OR DISREGARD EACH TREND

Rank	Trend No.	N	Per Cent of respondents checking each response			
			Impede	Accelerate	Adjust to	Disregard
			%	%	%	%
1	8	434	1.8	55.1	41.5	1.6
2	3	435	2.7	68.3	27.8	1.2
3	23	437	.2	59.3	39.1	1.4
4	45	437	1.1	79.9	18.3	.7
5	52	435	.2	68.3	30.1	1.4
6	24	437	.5	89.4	9.4	.7
7	4	434	.2	73.7	24.5	1.6
8	13	434	2.5	75.6	20.5	1.4
9	17	433	10.9	56.8	30.7	1.6
10	29	437	1.6	48.2	48.6	1.6
11	46	435	12.2	52.4	33.6	1.8
12	34	437	.2	72.5	24.3	3.0
13	26	436	5.7	22.0	69.3	3.0
14	43	436	.7	84.4	13.8	1.1
15	11	433	1.8	32.8	63.6	1.8
16	32	434	62.7	12.0	23.5	1.8
17	55	431	50.1	10.2	34.8	4.9
18	19	433	28.6	11.3	55.0	5.1
19	53	434	.7	90.1	8.1	1.1
20	7	434	16.6	9.4	69.4	4.6
21	33	437	12.8	20.4	63.2	3.6
22	22	432	21.3	53.5	19.9	5.3
23	42	433	15.7	15.5	65.3	3.6
24	18	437	1.6	41.6	53.4	3.4
25	21	436	.5	72.9	21.6	5.0
26	25	434	33.6	21.6	41.1	3.7
27	51	435	.5	84.1	12.4	3.0

TABLE VI (Continued)

Rank	Trend No.	N	Per Cent of respondents checking each response: Impede	Accelerate	Adjust to	Disregard
			%	%	%	%
28	12	433	3.9	35.6	57.5	3.0
29	6	436	1.1	42.9	51.4	4.6
30	54	432	45.6	12.7	35.0	6.7
31	31	436	6.4	41.0	45.3	7.3
32	50	434	.7	41.5	53.4	4.4
33	39	437	.9	29.7	61.8	7.6
34	5	432	8.6	26.6	58.6	6.2
35	38	435	7.6	14.2	70.1	8.1
36	30	434	34.1	10.8	46.6	8.5
37	9	434	7.4	18.4	65.4	8.8
38	28	434	8.3	12.2	71.2	8.3
39	44	437	.9	77.8	14.9	6.4
40	48	432	39.3	6.0	49.2	5.5
41	1	437	19.7	11.4	61.8	7.1
42	20	435	3.2	13.8	74.0	9.0
43.5	16	434	16.1	12.0	65.0	6.9
43.5	49	434	35.2	9.4	47.6	7.8
45	41	432	9.7	31.5	48.4	10.4
46	40	434	25.1	13.6	52.5	8.8
47	10	435	5.5	16.3	66.2	12.0
48	35	434	28.8	11.8	50.0	9.4
49	37	432	44.9	7.4	35.9	11.8
50	36	429	30.8	20.3	37.3	11.6
51	15	435	5.7	12.4	69.9	12.0
52	47	433	15.0	9.5	61.4	14.1
53	27	431	.7	30.6	54.5	14.2
54	14	436	1.8	8.3	68.4	21.5
55	2	437	2.3	19.9	48.3	29.5

TABLE VII

PERCENTAGE OF RESPONDENTS, IN EIGHT SUB-GROUPS AND TOTAL SAMPLE, WHO INDICATED THAT SCHOOLS SHOULD TAKE ACTION (IMPEDE OR ACCELERATE) REGARDING EACH TREND, AND RESULTS OF TESTS OF SIGNIFICANCE BETWEEN ACTION AND NON-ACTION RESPONDENTS

Trend Rank	No.	Response Groups: Agr. Educ.	H'm'k. Educ.	Ind. Educ.	Econo-mists	Sociol-ogists	Educ. Phil.	Manage-ment	Labor	Total Sample	Chi-Square
		%	%	%	%	%	%	%	%	%	
1	8	68.5	62.8	60.3	54.2	36.8	56.8	53.3	55.0	56.9	NS
2	3	75.9	78.5	72.0	60.4	67.4	60.8	75.5	85.0	71.0	NS
3	23	68.4	76.1	62.1	43.7	40.8	54.6	62.2	50.0	59.5	.001
4	45	90.7	92.0	77.6	75.0	67.3	81.3	75.6	75.0	81.0	.01
5	52	81.5	67.8	70.7	68.7	67.3	62.2	60.0	75.0	68.2	NS
6	24	90.7	93.2	93.1	85.4	89.8	89.3	86.7	85.0	89.9	NS
7	4	76.0	82.8	72.4	47.9	79.2	71.6	82.3	75.0	73.9	.01
8	13	85.2	69.0	84.4	68.8	75.0	88.0	81.8	65.0	78.1	.05
9	17	68.5	80.7	86.2	46.7	54.2	55.4	73.3	68.5	67.7	.001
10	29	27.8	68.3	53.4	43.7	57.2	53.3	31.1	40.0	49.8	.001
11	46	51.8	72.7	46.5	64.6	64.6	66.2	84.5	65.0	64.6	.01
12	34	57.4	79.5	75.9	75.0	69.4	80.0	62.2	75.0	72.7	NS
13	26	31.5	31.0	1.7	27.1	20.4	22.6	17.8	20.0	27.7	NS
14	43	79.6	92.0	82.8	75.0	85.7	84.0	89.6	95.0	85.1	NS
15	11	50.0	26.8	34.5	33.3	22.4	37.9	40.0	36.9	34.6	NS

TABLE VII (Continued)

Trend Rank	No.	Response Groups: Agr. Educ.	H'm'k. Educ.	Ind. Educ.	Econo-mists	Sociol-ogists	Educ. Phil.	Manage-ment	Labor	Total Sample	Chi-Square
		%	%	%	%	%	%	%	%	%	
16	32	63.0	76.7	72.4	66.6	75.5	80.0	80.0	89.5	74.7	NS
17	55	70.3	61.6	62.1	47.9	64.7	54.7	62.2	55.6	60.3	NS
18	19	46.3	41.8	39.6	27.0	40.8	43.9	33.3	45.0	39.9	NS
19	53	90.6	92.0	87.9	87.5	92.9	87.8	95.6	94.7	90.8	NS
20	7	35.2	36.4	27.6	22.9	46.5	15.1	22.2	5.2	26.0	.05
21	33	37.0	36.4	39.7	33.4	22.4	41.4	17.8	20.0	33.2	NS
22	22	68.6	84.9	70.6	52.1	79.2	77.0	75.5	94.7	74.8	.01
23	42	40.7	46.5	31.0	29.2	16.7	29.7	17.7	15.0	31.2	.01
24	18	48.2	42.0	36.2	31.3	55.1	54.6	22.2	60.0	43.2	.01
25	21	70.4	90.9	79.3	50.0	73.5	80.0	60.0	47.4	73.4	.001
26	25	57.4	46.6	50.0	72.9	54.2	54.6	62.2	50.0	55.2	NS
27	51	85.1	93.2	82.4	68.7	83.6	86.6	80.0	94.7	84.2	.02
28	12	37.1	50.5	41.3	16.6	38.7	42.5	37.8	42.1	39.5	.05
29	6	51.8	54.5	39.7	39.6	40.8	49.3	22.2	36.9	44.0	NS
30	54	61.1	55.7	62.0	52.0	52.1	58.3	62.2	73.7	58.3	NS
31	31	38.9	59.1	35.1	33.4	44.9	61.4	33.3	75.0	47.4	.001
32	50	42.5	42.0	36.8	50.0	39.6	45.3	35.6	47.4	42.2	NS
33	39	22.2	30.6	43.1	39.6	10.2	30.7	31.1	45.0	30.6	.01
34	5	31.4	62.1	29.8	39.6	28.6	48.7	31.1	38.8	35.2	.02
35	38	24.1	28.4	24.1	33.3	18.8	16.2	8.9	10.0	21.8	NS

TABLE VII (Continued)

Rank	Trend No.	Response Groups: Agr. Educ.	H'm'k. Educ.	Ind. Educ.	Econo-mists	Sociol-ogists	Educ. Phil.	Manage-ment	Labor	Total Sample	Chi-Square
		%	%	%	%	%	%	%	%	%	
36	30	39.6	47.7	44.8	29.2	41.7	71.6	46.7	80.0	44.9	.05
37	9	18.6	30.2	19.0	14.6	22.4	33.8	11.0	85.0	25.8	.001
38	28	14.9	27.3	8.6	14.5	27.1	20.0	22.8	36.8	20.5	.05
39	44	85.2	93.2	63.8	64.6	83.7	80.0	71.1	75.0	78.7	.001
40	48	40.7	59.0	56.1	47.9	84.6	57.5	75.3	60.0	45.3	.01
41	1	37.0	50.0	17.2	14.6	28.5	30.7	20.0	45.0	31.1	.001
42	20	42.2	25.3	22.4	12.5	6.1	14.7	11.4	10.0	17.0	NS
43.5	49	40.7	59.0	56.1	31.2	35.4	30.7	62.2	26.3	44.6	.001
43.5	16	37.0	46.5	22.4	12.5	22.4	23.0	17.8	35.0	28.1	.001
45	41	42.6	47.7	43.8	27.1	38.8	40.5	44.4	36.8	41.2	NS
46	40	48.1	60.4	34.5	27.1	22.9	33.3	33.3	30.0	38.7	.001
47	10	27.8	31.0	15.5	10.4	16.4	29.3	6.7	31.6	21.8	.01
48	35	29.6	54.0	31.0	25.0	49.0	46.6	35.6	45.0	40.6	.01
49	37	64.8	59.3	48.3	35.4	50.0	46.0	64.4	42.1	52.3	NS
50	36	42.6	66.3	42.1	47.9	34.1	60.8	53.3	39.9	51.1	.01
51	15	29.7	27.5	28.7	8.3	8.2	14.9	6.7	20.0	18.1	.01
52	47	27.8	36.7	14.0	22.9	22.9	17.6	22.2	30.0	24.5	.01
53	27	35.2	44.8	25.9	17.0	31.9	36.5	13.3	31.6	31.3	.01
54	14	16.7	14.7	17.2	2.1	6.2	8.0	2.2	5.0	10.1	.05
55	2	29.6	32.9	22.4	12.5	16.3	20.0	22.2	0	22.2	.02

thirty-four were rejected at the 5 per cent level of significance or greater. The pattern of agreement-disagreement which prevailed with regard to ratings of importance of trends also was evidenced with regard to action. Of the 20 trends ranked highest, hypotheses were rejected for only eight items, whereas of the remaining 35 trends, hypotheses were rejected for 26 items. The differences in proportions were statistically significant, according to the results of a Chi-square test of independency.

Not only do the data in Table VII show that disagreement among jurors tended to increase as trend scores decreased, but, also, the data show that the per cent of the total jury indicating action tended to decrease as scores of trends decreased. The rank order correlation coefficient between the ranks according to importance and the ranks according to the per cent of respondents indicating action was .62. These data suggest that, in general, major attention should be given to accelerating the action implied in the trends ranked highest in planning the curriculum.

CHAPTER III. SUMMARY

This chapter reports the results of quantitative analysis of value judgments expressed by a jury of specialists with regard to (1) the extent to which identified social, economic, and technical trends should be considered in planning future programs of vocational education, and (2) how should the school react to each identified trend.

On the basis of the findings included in this chapter the following generalizations may be made:

1. The obtained rank order of the identified trends was based upon a procedure of assigning quantitative values to qualitative data, and the scaling procedure resulted in an extremely high reliability coefficient. The results of scaling indicated that the respondents did not assign random ratings to items; rather, there was ample evidence that choices were made upon a more critical basis.

2. The degree of correlation found between the sub-jury groups indicated that the groups were in basic agreement with the average ratings and the rank order average ratings of the 55 trends.

3. The differences that existed between the various sub-jury categories regarding the relevance of individual trends for planning programs of vocational education tended to become more frequent and pronounced as the relative importance of the trend decreased.

4. The majority of respondents did not believe that the identified trends could be disregarded in planning educational programs.

5. There was wide variation in the overall patterns of responses concerning action or direction to be taken with regard to curriculum planning in terms of the trend items. This suggested that each individual trend item should be observed independently in order to obtain the benefit of jury judgment with regard to action or direction to be taken in planning the school curriculum.

6. The extent of agreement among sub-juries regarding action decreased as the relative importance of the trends diminished.

CHAPTER IV

OPINIONS REGARDING VOCATIONAL EDUCATION AND THE ROLE OF THE SCHOOL IN SOCIETY

Four items in Part II of the trends questionnaire were concerned with the opinion of respondents regarding what is now and what should be (1) the nature of vocational education, (2) the clientele served by vocational education, (3) the importance of vocational education, and (4) the role of the public school in society. These items were included to help establish the frames of reference from which respondents reacted to Part I of the study dealing with the relevance of trends and the action to be taken by the school with regard to these trends.

I. OPINIONS REGARDING THE NATURE OF VOCATIONAL EDUCATION

A person's background normally tends to influence conceptions concerning the nature of things as they are believed to exist and as they should exist. Thus, in requesting jurors who represented several different professional backgrounds to indicate the extent to which they believed selected trends were relevant in planning for future programs of vocational education, it seemed pertinent that conceptions regarding the nature of vocational education of the respondents be identified, quantified, and studied. Respondents were asked to react to two questions: (1) In your judgment, what most nearly describes the nature of programs of vocational education as currently practiced in the high schools? (2) In your judgment, what most nearly describes what should be the nature of future programs of vocational education in the high schools? Responses were registered by selecting one of four possible response categories which, in brief, suggested that vocational education primarily (1) should emphasize simple manual skills and related information, (2) should emphasize occupational adjustment, (3) should emphasize occupational adjustment together with an understanding of the relationship between societal welfare and occupational proficiency, and (4) should emphasize an educational program, general in nature, upon which subsequent specialized preparation may be based.

Opinions of the Total Jury Regarding Nature of Vocational Education

The response pattern for the total jury with regard to what is now and what should be the nature of vocational education programs in American high schools is shown in Table VIII. A striking observation that can be noted from the data found in Table VIII is the marked shift in conceptions of the jury relative to what is now the nature of vocational education to conceptions of vocational education as it

should be operated in public schools. A null hypothesis to the effect that opinions of respondents were independent of whether they were reacting to what is now or what should be the nature of vocational education was postulated and tested by the chi-square test of independency in contingency tables. The hypothesis was rejected at the .1 per cent level of confidence.

The majority of jury members, according to the data in Table VIII, selected a response suggesting a narrowly held conception of vocational education as the programs are currently operated in the public schools. Forty-three per cent of the total jury indicated that they believed current vocational programs primarily are emphasizing the acquisition of simple manual skills and related knowledge. However, 35.4 per cent of the jury checked the response that indicated that they believed current programs are oriented primarily toward occupational proficiency in a vocation. Less than one fourth of the jury members checked responses which were designed to describe broadly conceived programs of vocational education.

By contrast, nearly one half (42.7 per cent) of the jury members indicated that future programs of vocational education should be general in nature at the high school level, with emphasis on knowledge and understanding sufficiently broad to serve as a basis for subsequent preparation at post high school levels. Only seven per cent of the respondents checked the first response which describes a program emphasizing skills and related knowledge. Of the remaining jury members, 19.9 per cent checked the second response, which emphasized occupational adjustment, and 30.4 per cent checked the third response, which was designed to describe relatively broad vocational educational programs emphasizing both occupational adjustment and the relationship between occupational proficiency and societal welfare.

Summarized, predominate opinion of the jury members regarding conceptions concerning what is now and what should be the nature of vocational education indicated that vocational programs currently are considered relatively narrow in scope with emphasis primarily on the development of simple skills and related knowledge. Against this position was the conception evidenced by predominate opinion that future programs of vocational education should be relatively broad in scope emphasizing not only occupational proficiency, but the relationship between occupational proficiency and societal welfare, or emphasizing general knowledge and understanding upon which subsequent specialized preparation may be based.

Opinions of Vocational Education Sub-Juries Regarding Nature of Vocational Education

Special attention was given to the opinions of the vocational education sub-jury members in the total jury of respondents. The

opinions of vocational educators included in the jury, showing the number and per cent selecting each response category regarding what is now and what should be the nature of vocational education is presented in Table IX. A hypothesis to the effect that the three sub-jury groups representing agriculture, home economics, and industrial education, respectively were in substantial agreement concerning the current nature of vocational education was tested. The hypothesis was rejected at the .1 per cent level of confidence. A second hypothesis to the effect that the three sub-jury groups were in substantial agreement concerning what should be the nature of future programs of vocational education also was rejected at the .1 per cent level of confidence.

TABLE VIII

RESULTS OF TESTS OF SIGNIFICANCE, SHOWING THE PER CENT AND NUMBER OF JURORS CHECKING VARIOUS RESPONSE CATEGORIES FOR "WHAT IS NOW" AND "WHAT SHOULD BE" THE NATURE OF VOCATIONAL EDUCATION.

Nature of Present Programs of Vocational Education			Nature of Future Programs of Vocational Education	
WHAT IS NOW			WHAT SHOULD BE	
Per Cent	No.	Response Categories	Per Cent	No.
43.0	181	1. An educational program emphasizing the acquisition of simple manual skills and related knowledge requisite to fitting persons for useful employment.	7.0	30
34.5	145	2. An educational program emphasizing occupational adjustment, with special reference to selecting an occupation, developing abilities and understandings, and progressing in a vocation.	19.9	85
7.8	33	3. An educational program emphasizing the relationship between vocational proficiency and societal welfare, with special reference to occupational information, preparation, and adjustment.	30.4	130
14.7	62	4. An educational program, general in nature, emphasizing knowledge and understandings sufficiently broad to serve as a basis for subsequent specialized training at post high school level.	42.7	183
100.0	421	$P < .001$	100.0	428

TABLE IX

RESULTS OF TESTS OF SIGNIFICANCE, SHOWING THE PER CENT AND NUMBER OF RESPONDENTS IN THREE SUB-JURY GROUPS OF VOCATIONAL EDUCATORS CHECKING VARIOUS RESPONSE CATEGORIES FOR "WHAT IS NOW" AND "WHAT SHOULD BE" THE NATURE OF VOCATIONAL EDUCATION

Nature of Present Programs of Vocational Education — WHAT IS NOW							Nature of Future Programs of Vocational Education — WHAT SHOULD BE					
Agr. Educ.		H'm'g. Educ.		Ind. Educ.		Response Categories	Agr. Educ.		H'm'g. Educ.		Ind. Educ.	
N	Per Cent	N	Per Cent	N	Per Cent		N	Per Cent	N	Per Cent	N	Per Cent
25	47.2	19	21.6	19	33.3	1. An educational program emphasizing the acquisition of simple manual skills and related knowledge requisite to fitting persons for useful employment.	6	11.3	2	2.3	12	21.0
18	34.0	30	34.1	29	50.9	2. An educational program emphasizing occupational adjustment, with special reference to selecting an occupation, developing abilities and understandings, and progressing in a vocation.	18	34.0	10	11.6	17	29.8
5	9.4	14	15.9	3	5.3	3. An educational program emphasizing the relationship between vocational proficiency and societal welfare, with special reference to occupational information, preparation, and adjustment.	24	45.3	28	32.6	14	24.6
5	9.4	25	28.4	6	10.5	4. An educational program, general in nature, emphasizing knowledge and understandings sufficiently broad to serve as a basis for subsequent specialized training at post high school level.	5	9.4	46	53.5	14	24.0
53	100.0	88	100.0	57	100.0		53	100.0	86	100.0	57	100.0
	P < .001					Chi-Square		P < .001				

Closer examination of the data presented in Table IX reveals that, for what is now, the response patterns of homemaking educators differed markedly from the response patterns of agricultural educators and industrial educators. Additional tests of significance were applied to ascertain whether proportions in the response patterns of each group were independent of the proportions of the other two groups. The response pattern of the agricultural education and industrial education groups did not differ significantly. When, however, the proportions in response patterns of the homemaking education group were compared independently with proportions of the agricultural education and industrial education groups, differences significant at the .1 per cent level of confidence were obtained. Homemaking educators were more likely than agricultural educators or industrial educators to select the third or fourth response category, when reacting to nature of existing programs of vocational education, and thus, were more prone to describe existing programs as being relatively broad and general in nature. Agricultural and industrial educators, concomitantly, were more likely, than homemaking educators, to select the first or second response category in describing existing programs of vocational education, indicating a conception of existing programs as being concerned primarily with the development of simple skills, or solely with occupational adjustment.

When the response patterns for the three sub-groups are compared on reactions to what should be the nature of vocational education, three distinct patterns of responses are observed. The proportions for each group differed significantly from the proportions for each of the other two groups at the 5 per cent level of confidence or higher. The majority of the agricultural educators, 79.3 per cent to be exact, selected response categories two or three to describe the nature of vocational programs as they should be operated in public schools. Thus, they tended to reject both a relatively narrow program emphasizing skills (response category one) or a broad general program (response category four) as appropriate for vocational education. The majority of homemaking educators, 53.5 per cent, selected response category four, indicating that, in their judgement, the vocational programs at the high school level should be relatively broad and general in nature. Only 13.9 per cent of the respondents in this group selected response category one or two, designed to describe vocational programs which are limited solely to preparation for occupational proficiency. By contrast, the industrial educators were divided evenly as to which of the four response categories describe what should be the nature of vocational education. (Indeed, a hypothesis to the effect that the proportions of respondents checking each of the four categories were equal was found to be tenable.) These data, therefore, suggest relatively wide differences of opinion among vocational educators as to what should be the nature of vocational programs.

Notwithstanding the disparity of response patterns of vocational education sub-groups as to what should be the nature of vocational education, in each instance there was a significant shift between proportion of responses for the four response categories for what is now and what should be.

Opinions of Eight Sub-Juries Regarding Nature of Vocational Education

The results of tests of significance applied to determine whether responses to what is now the nature of vocational education are independent of what should be, for the eight sub-jury groups are shown in Table X. Eight hypotheses were tested, and each hypothesis was rejected at the 1 per cent level of confidence or greater. The industrial education group was the only group for which the hypothesis was rejected at the 1 per cent level. For the other seven groups, the hypothesis was rejected at the .1 per cent level of confidence.

Although Table X also shows that the eight sub-juries differed significantly (at the .1 per cent level of confidence) both in proportion of each response category for what is now and for what should be, the patterns of responses for the groups indicated clearly that changes should be made from what the sub-juries believed is now the nature of vocational programs in the public schools to the nature of vocational programs that should be operated in the public schools. The majority of each of the eight sub-jury groups selected either response category one or two to describe their current conceptions of vocational programs. In seven of the eight sub-jury groups, the majority selected either response category three or four to describe the nature of vocational programs as they should be operated in the public schools. The exception to the general pattern was the industrial education sub-jury. This sub-jury was divided almost equally in selecting each of the four responses with regard to opinions of what should be the nature of future programs of vocational education.

At this point it would be inadvisable to conclude that predominate opinion of the jurors concerning the nature of existing programs of vocational education approximated reality. Nor should predominate opinion of the jurors concerning conceptions of the desirable nature for vocational education necessarily be viewed as the guide for planning future programs. Rather, these conceptions tended to suggest the frame of reference of the jurors against which judgements concerning the relevance of the selected trends were made.

II. OPINIONS REGARDING CLIENTELE TO BE ACCOMMODATED

Opinions of jurors were solicited in regard to the clientele current programs are designed to accommodate and the clientele future

TABLE X

RESULTS OF TESTS OF SIGNIFICANCE, SHOWING THE PER CENT OF RESPONDENTS IN EACH SUB-JURY GROUP CHECKING VARIOUS RESPONSE CATEGORIES FOR "WHAT IS NOW" AND "WHAT SHOULD BE" THE NATURE OF VOCATIONAL EDUCATION

Response Category	Response Groups															
	Agr. Educ.		H'm'g. Educ.		Ind. Educ.		Economists		Soc'l'gsts		Educ. Phil.		Management		Labor	
	I*	S*	I	S	I	S	I	S	I	S	I	S	I	S	I	S
N	53	53	88	86	57	57	45	47	47	46	71	74	44	45	16	20
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
1	47.2	11.3	21.6	2.3	33.3	21.0	55.5	6.4	59.7	0	50.7	4.1	45.4	8.9	56.2	0
2	34.0	34.0	34.1	11.6	50.9	29.8	28.9	31.9	19.1	23.9	35.2	5.4	40.9	15.6	18.8	15.0
3	9.4	45.3	15.9	32.6	5.3	24.6	6.7	23.4	2.1	28.3	5.6	32.4	2.3	20.0	12.5	35.0
4	9.4	9.4	28.4	53.5	10.5	24.6	8.9	38.3	19.1	47.8	8.4	58.1	11.4	55.5	12.5	50.0
Chi-Square	P< .001		P< .001		P < .01		P< .001		P< .001		P< .001		P< .001		P< .001	

*I = What Is Now *S = What Should Be

Differences among groups for What Is Now significant at .1 per cent level of confidence.
Differences among groups for What Should Be significant at .1 per cent level of confidence.

Response Categories

1. An educational program emphasizing the acquisition of simple manual skills and related knowledge requisite to fitting persons for useful employment.

2. An educational program emphasizing occupational adjustment, with special reference to selecting an occupation, developing abilities and understandings, and progressing in a vocation.

3. An educational program emphasizing the relationship between vocational proficiency and societal welfare, with special reference to occupational information, preparation, and adjustment.

4. An educational program, general in nature, emphasizing knowledge and understandings sufficiently broad to serve as a basis for subsequent specialized training at post high school level.

programs should be designed to accommodate. The reactions to the what is now and what should be clientele questions were made by checking one of three possible choices, which were: (1) students who do not meet academic standards and are likely to leave high school before graduation, (2) students who plan to graduate and obtain employment upon graduation, and (3) students who may or may not continue their education beyond high school, but possess interest and aptitude for the occupational training offered.

Opinions of Total Jury Regarding Clientele

Table XI shows the response pattern of the total jury with regard to the clientele for whom vocational education programs are designed or should be designed to accommodate. To ascertain whether the response patterns of jurors differed significantly when the various distributions for what is now and what should be the clientele accommodated were compared, a null hypothesis to test independence was postulated. Rejection of the hypothesis at the .1 per cent level of confidence suggested that a significant number of jurors believed the clientele that vocational programs should accommodate was not the same as those believed to accommodate currently.

Table XI shows that the per cent of jury responses were divided fairly evenly among the three possible response categories with regard to the clientele current programs are designed to accommodate. However, there was a decided shift in opinion with regard to the clientele future programs should be designed to accommodate. Nearly 80 per cent (78.6 per cent) of the jury checked a response to indicate that future programs should be designed to accommodate all students regardless of their post high school educational plans, providing they possess interest and aptitude for the particular vocational education program.

Opinions of Vocational Education Sub-Juries Regarding Clientele

Table XII reports the distribution of opinions among the three sub-juries of vocational educators, indicating the number and per cent selecting each response category for what is now and what should be the clientele for whom vocational programs are designed to accommodate. Null hypotheses to the effect that there were no significant differences in the proportions of vocational educators in the three sub-juries checking each response category were tested, both for what is now and what should be the students to be accommodated by vocational programs. With regard to what is now, the hypothesis was rejected at the 1 per cent level of confidence. The rejection of this hypothesis suggested a wide divergence of opinions among the three sub-juries as to the clientele for whom current vocational programs are designed. Examination of the data in Table XII reveals that the agricultural educators were most likely and the industrial educators least likely of the three

groups to check a response indicating that they believed existing programs are designed for students regardless of level of mental ability. Additional tests of independency were made of the data, and these tests revealed that the proportions of agricultural educators and homemaking educators checking each response category did not differ significantly. Differences in proportions between the agricultural education and industrial education group, however, were significant at the 1 per cent level of confidence, and between the homemaking education and industrial education were significant at the 5 per cent level.

The what should be hypothesis was found to be tenable. The high per cent of respondents in each of the three groups who checked response category three was indicative of general agreement of many vocational educators to the effect that vocational programs should be designed to accommodate all students who have aptitude for or are interested in preparing for a vocation, regardless of future plans for education at the post high school level.

TABLE XI

RESULTS OF TESTS OF SIGNIFICANCE, SHOWING THE PER CENT AND NUMBER OF JURORS CHECKING VARIOUS RESPONSE CATEGORIES FOR "WHAT IS NOW" AND "WHAT SHOULD BE" THE CLIENTELE FOR WHOM VOCATIONAL EDUCATION PROGRAMS ARE DESIGNED TO ACCOMMODATE

Students: Present Vocational Programs are Designed to Accommodate			Students: Future Vocational Programs are Designed to Accommodate	
WHAT IS NOW			WHAT SHOULD BE	
%	No.	Response Categories	%	No.
24.3	102	1. Students who cannot or will not meet standards for academic programs and who are likely to leave high school before graduation.	2.4	10
38.1	160	2. Students who plan to graduate from high school and obtain employment immediately after graduation.	19.0	80
37.6	158	3. Students who may or may not continue education beyond high school, but who are interested in and possess aptitude for occupations for which preparation is offered at the high school level.	78.6	330
100.0	420	P < .001	100.0	420

TABLE XII

RESULTS OF TESTS OF SIGNIFICANCE, SHOWING THE PER CENT AND NUMBER OF RESPONDENTS IN THREE SUB-JURY GROUPS OF VOCATIONAL EDUCATORS CHECKING VARIOUS RESPONSE CATEGORIES FOR "WHAT IS NOW" AND "WHAT SHOULD BE" THE CLIENTELE FOR WHOM VOCATIONAL EDUCATION PROGRAMS ARE DESIGNED TO ACCOMMODATE

Students: Present Vocational Programs are Designed to Accommodate							Students: Future Vocational Programs are Designed to Accommodate					
WHAT IS NOW							WHAT SHOULD BE					
Agr. Educ.		H'm'g. Educ.		Ind. Educ.		Response Categories	Agr. Educ.		H'm'g. Educ.		Ind. Educ.	
N	Per Cent	N	Per Cent	N	Per Cent		N	Per Cent	N	Per Cent	N	Per Cent
5	9.2	8	9.3	11	19.2	1. Students who cannot or will not meet standards for academic programs and who are likely to leave high school before graduation.	0	0	3	3.5	0	0
8	14.8	26	30.2	23	40.4	2. Students who plan to graduate from high school and obtain employment immediately after graduation.	5	9.6	7	8.2	12	21.1
41	76.0	52	60.5	23	40.4	3. Students who may or may not continue education beyond high school, but who are interested in and possess aptitude for occupations for which preparation is offered at the high school level.	47	90.4	75	88.3	45	78.9
54	100.0	86	100.0	57	100.0		52	100.0	85	100.0	57	100.0
P < .01						Chi-Square	P < .05					

Opinions of Eight Sub-Jury Groups Regarding Clientele

Table XIII shows the distribution in per cent groupings for the eight sub-jury groups when the responses to what is now the clientele accommodated reactions are compared with the what should be the clientele accommodated reactions with regard to design of vocational education programs. For each of the sub-jury groups, the null hypothesis that opinions concerning what is now the clientele accommodated were substantially the same as the clientele that should be accommodated in vocational education was tested. With one exception the null hypotheses were rejected at the .1 per cent level of confidence. The exception was the agricultural education sub-jury, where the difference between proportions of responses for what is now and what should be were significant at the 5 per cent level. The opinion of jury members shifted markedly in the direction of response category three when responding to the what should be items. This shift of opinion suggests that many jurors believed future programs of vocational education should be designed to accommodate students without regard to their plans for post high school education, and that entrance into vocational programs should be contingent on interest in and aptitude for the occupation or occupations for which preparation is being offered.

In addition to reporting shifts in opinions from clientele for whom existing programs are designed to accommodate to clientele for whom future programs of vocational education should be designed to serve, Table XIII also shows the variability among the several sub-juries in proportions of respondents checking each of the three response categories, both for the what is now and the what should be items. Examination of the data reveals wide variations in the proportion of respondents in the sub-juries checking each response category, especially for the what is now items. Whereas, for example, only 9.2 per cent of the agricultural education sub-jury indicated that they believed current programs are designed primarily for students who are not likely to graduate from high school, 60.0 per cent of the labor sub-jury selected this response. The remaining sub-juries ranged between these extremes. The differences for the what is now part were significant at the .1 per cent level of confidence.

Similarly, there were wide variations among the groups in describing the clientele for whom future programs should be designed to accommodate. Even though the majority of respondents in each sub-jury checked response category three, the proportion of respondents checking this category ranged from 55.4 per cent for the economists to 90.4 for the agricultural educators. The differences for the what should be part, likewise, were significant at the .1 per cent level.

TABLE XIII

RESULTS OF TESTS OF SIGNIFICANCE, SHOWING THE PER CENT OF RESPONDENTS IN EACH SUB-JURY GROUP CHECKING VARIOUS RESPONSE CATEGORIES FOR "WHAT IS NOW" AND "WHAT SHOULD BE" THE CLIENTELE FOR WHOM VOCATIONAL EDUCATION PROGRAMS ARE DESIGNED TO ACCOMMODATE

Response Category	Response Groups															
	Agr. Educ.		H'm'g. Educ.		Ind. Educ.		Economists		Soc'l'gsts		Educ. Phil.		Management		Labor	
	I*	S*	I	S	I	S	I	S	I	S	I	S	I	S	I	S
N	54	52	86	85	57	57	45	47	47	46	71	69	45	45	15	19
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
1	9.2.	0	9.3	3.5	19.2	0	26.6	4.2	48.9	2.2	32.4	4.3	24.4	2.2	60.0	0
2	14.8	9.6	30.2	8.2	40.4	21.1	55.6	40.4	38.3	26.1	46.5	15.9	48.9	22.2	33.3	21.1
3	76.0	90.4	60.5	88.3	40.4	78.9	17.8	55.4	12.8	71.9	21.1	79.7	26.7	75.6	6.7	78.9
Chi-Square	P< .05		P< .001		P< .001		P< .001		P< .001		P< .001		P< .001		P< .001	

*I = What Is Now *S = What Should Be

Differences among groups for What Is Now significant at .1 per cent level of confidence.
Differences among groups for What Should Be significant at .1 per cent level of confidence.

Response Categories

1. Students who cannot or will not meet standards for academic programs and who are likely to leave high school before graduation.
2. Students who plan to graduate from high school and obtain employment immediately after graduation.
3. Students who may or may not continue education beyond high school, but who are interested in and possess aptitude for occupations for which preparation is offered at the high school level.

III. OPINIONS REGARDING THE IMPORTANCE OF VOCATIONAL EDUCATION

To obtain judgements presumed to reflect background beliefs regarding the importance of vocational education, respondents were asked (1) to evaluate the importance of existing programs of vocational education in light of opinions regarding what is now the nature of vocational education and the clientele present programs are designed to accommodate, and (2) to evaluate the importance of future programs of vocational education in light of opinions regarding what should be the nature of vocational programs and the clientele future programs should be designed to accommodate. Opinions were elicited by requesting the jurors to select one of three response categories which included (1) of little or no importance, (2) of some importance, and (3) of great importance.

Opinions of Total Jury Regarding Importance of Vocational Education

Data reported in Table XIV show the response patterns and the results of statistical tests which involve reaction to what is now and what should be the importance of vocational education of the total jury. The hypothesis to the effect that there was substantial agreement in the proportion of respondents reacting to the various categories for what is now and what should be was tested by the chi-square test of independency in contingency tables. The hypothesis was rejected at the .1 per cent level of confidence. As shown in Table XIV, there was a definite shift in opinion from what is now to what should be. A total of 352 respondents, or 81.7 per cent of the entire jury, indicated that under desirable conditions vocational education should be considered "of great importance" in the public schools, whereas only 174 respondents, or 41.3 per cent, accorded this rating of importance to vocational programs now in operation in the public schools.

Opinions of Vocational Education Sub-Juries Regarding Importance

Hypotheses restricted to the three vocational education sub-jury groups were formulated and tested to check agreement among these sub-juries. Table XV reports the response patterns and the results of statistical tests for the what is now responses and the what should be responses to questions dealing with the importance of vocational education. The test results of the what is now hypothesis and the what should be hypothesis indicated no significant difference, consequently, the hypotheses were regarded as tenable. As might be expected, a high proportion of the vocational educators (59.3 per cent) in the three sub-jury groups viewed vocational education currently as being of great importance in the secondary schools, and an even higher proportion of these educators (95.8 per cent) believed that under desirable conditions vocational educations in the future should be rated of great importance.

TABLE XIV

RESULTS OF TESTS OF SIGNIFICANCE, SHOWING THE PER CENT AND NUMBER OF JURORS CHECKING VARIOUS RESPONSE CATEGORIES FOR "WHAT IS NOW" AND "WHAT SHOULD BE" THE IMPORTANCE OF VOCATIONAL EDUCATIONAL PROGRAMS

Importance of Present Programs of Vocational Education			Importance of Vocational Education Under Desired Conditions	
WHAT IS NOW			WHAT SHOULD BE	
%	No.	Response Categories	%	No.
4.8	20	1. Of little or no importance.	1.4	6
53.9	227	2. Of some importance.	16.9	73
41.3	174	3. Of great importance.	81.7	352
100.0	421	$P < .001$	100.0	431

Opinions of Eight Sub-Jury Groups Regarding Importance of Vocational Education

Data comparing the response pattern as to what is now and what should be the importance of vocational education for each of the eight sub-jury groups are presented in Table XVI. The hypotheses which tested the relationship between opinions expressed by each sub-jury group when reacting to what is now and what should be the importance of vocational education were rejected in every case at the 1 per cent, or greater, level of confidence. Observation of data revealed that the opinion patterns for the various sub-jury groups shifted pronouncedly in direction from lower ratings of importance of currently (what is now) operated programs toward higher ratings of importance for vocational education as it should be operated in the public schools.

The eight sub-juries were in substantial agreement that vocational programs should be accorded a rating of greater importance when operated under what jury members believed were desired conditions than under what jury members believed were actual conditions. However, considerable variability appears in the proportion of ratings checked in the response categories for both the what is now and what should be regarding the importance of vocational education. Hypotheses to the effect that the proportion of respondents in each sub-jury checking each response category were independent of the sub-jury to which the

TABLE XV

RESULTS OF TESTS OF SIGNIFICANCE, SHOWING THE PER CENT AND NUMBER OF RESPONDENTS OF THREE SUB-JURY GROUPS OF VOCATIONAL EDUCATORS CHECKING VARIOUS RESPONSE CATEGORIES FOR "WHAT IS NOW" AND "WHAT SHOULD BE" THE IMPORTANCE OF VOCATIONAL EDUCATION PROGRAMS

Importance of Present Programs of Vocational Education							Importance of Vocational Education Under Desired Conditions					
WHAT IS NOW							WHAT SHOULD BE					
Agr. Educ.		H'm'g Educ.		Ind. Educ.		Response Categories	Agr. Educ.		H'm'g. Educ.		Ind. Educ.	
N	%	N	%	N	%		N	%	N	%	N	%
0	0	1	1.1	1	1.7	1. Of little or no importance.	0	0	0	0	0	0
26	49.0	30	34.1	23	39.6	2. Of some importance.	1	1.9	5	5.7	2	3.4
27	51.0	57	64.8	34	58.7	3. Of great importance.	52	98.1	83	94.3	56	96.6
53	100.0	88	100.0	58	100.0		53	100.0	88	100.0	58	100.0
P < .05						Chi-Square	P < .05					

TABLE XVI

RESULTS OF TESTS OF SIGNIFICANCE, SHOWING THE PER CENT OF RESPONDENTS IN EACH SUB-JURY GROUP CHECKING VARIOUS RESPONSE CATEGORIES FOR "WHAT IS NOW" AND "WHAT SHOULD BE" THE IMPORTANCE OF VOCATIONAL EDUCATION PROGRAMS

Response Category	Response Groups															
	Agr. Educ.		H'm'g. Educ.		Ind. Educ.		Economists		Soc'l'gsts		Educ. Phil.		Management		Labor	
	I*	S*	I	S	I	S	I	S	I	S	I	S	I	S	I	S
N	53	53	88	88	58	58	46	47	47	46	72	74	45	45	18	20
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
1	0	0	1.1	0	1.7	0	6.5	2.1	8.5	4.3	11.1	2.7	4.4	0	5.6	5.0
2	49.0	1.9	34.1	5.7	39.6	3.4	69.6	40.4	59.6	28.3	65.3	23.0	66.7	20.0	61.1	35.0
3	51.0	98.1	64.8	94.3	58.7	96.6	23.9	57.5	31.9	67.4	23.6	74.3	28.9	80.0	33.3	60.0
Chi-Square	P < .001		P < .001		P < .001		P < .01		P < .01		P < .001		P < .001		P < .001	

*I = What Is Now *S = What Should Be

Differences among groups for What Is Now significant at .1 per cent level of confidence.
Differences among groups for What Should Be significant at .1 per cent level of confidence.

Response Categories

1. Of little or no importance.
2. Of some importance.
3. Of great importance.

respondent belonged, formulated and tested both for what is now and what should be, were rejected at the .1 per cent level of confidence, as reported in Table XVI.

IV. OPINIONS REGARDING THE PRIMARY ROLE OF THE PUBLIC SCHOOLS

A fourth item pertained to opinion regarding the role of the school in society. This item was included to obtain an indication of the philosophic orientation of the respondent against which opinions regarding how the school should react to each trend might be compared. Inasmuch as the basic question of what should be the role of the public school in society is one of the persistent issues in education, especially with reference to curriculum development, analyses of responses to this item, in itself, merit consideration.

Opinions of the Total Jury Regarding the Role of the School in Society

Table XVII reports the opinions of the total jury regarding what is now and what should be the primary role of the public school in American society. Null hypotheses that there were no differences between repondents' reactions to the three categories for what is now and what should be the role were tested by the chi-square test of independency in contingency tables, and were rejected at the .1 per cent level of confidence. The majority of jurors (85.4 per cent) indicated by selecting response category one or two that they believed American public schools conduct educational programs which tend to conserve the cultural heritage, or, at most, manifest the existing social order.

When the jurors reacted to the question of "What should be the role of the school in society?", a decided shift of opinion was observed. Of the 396 respondents who replied to this question, more than one half, 52.3 per cent, indicated that the public schools should assume a dynamic role in reconstructing and redirecting society. Nearly 35 per cent of the jurors advocated that the primary role should be to examine and manifest the existing social order, while only 12.9 per cent indicated that the primary role should be to conserve and perpetuate the cultural heritage.

Opinions of Vocational Education Sub-Juries Regarding the Role of the School in Society

The response patterns of the vocational education sub-juries regarding the primary role of the school in society appear in Table XVIII. The chi-square statistic was applied to test null hypotheses that there were no differences in the proportion of respondents in the three sub-juries who checked the three categories both for what

is now and what should be. Statistically significant differences in opinion did occur among the three sub-juries in reacting to what is now the primary role of the school, thereby causing the rejection of the hypothesis at the 1 per cent level of confidence. Of the three groups, the homemaking educators were most likely and the industrial educators least likely to check response category two or three. Concerning reactions to what should be the role of the school in society, the proportions of the three groups checking each category did not differ significantly, and the null hypothesis was found to be tenable.

TABLE XVII

RESULTS OF TESTS OF SIGNIFICANCE, SHOWING THE PER CENT AND NUMBER OF JURORS CHECKING VARIOUS RESPONSE CATEGORIES FOR "WHAT IS NOW" AND "WHAT SHOULD BE" THE PRIMARY ROLE OF THE PUBLIC SCHOOL IN AMERICAN SOCIETY

What is the primary role of the public school?			What should be the primary role of the public school?	
WHAT IS NOW			WHAT SHOULD BE	
Per Cent	No.	Response Categories	Per Cent	No.
41.5	168	1. The school is an agent primarily concerned with conserving and perpetuating the cultural heritage.	12.9	51
43.9	178	2. The school is an agent primarily concerned with examining and manifesting the existing social order.	34.8	138
14.6	59	3. The school is an agent primarily concerned with reconstructing and redirecting society.	52.3	207
100.0	405	$P < .001$	100.0	396

Opinions of Eight Sub-Juries Regarding the Role of the School in Society

The data comparing the opinion response patterns of each of the eight sub-jury groups as to what is now and what should be the primary role of the school in society are presented in Table XIX. Chi-square tests of independence in contingency tables were made to test eight null hypotheses that, for each sub-jury, proportions of

TABLE XVIII

RESULTS OF TESTS OF SIGNIFICANCE, SHOWING THE PER CENT AND NUMBER OF RESPONDENTS IN THREE SUB-JURY GROUPS OF VOCATIONAL EDUCATORS CHECKING VARIOUS RESPONSE CATEGORIES FOR "WHAT IS NOW" AND "WHAT SHOULD BE" THE PRIMARY ROLE OF THE PUBLIC SCHOOL IN AMERICAN SOCIETY

What is the primary role of the public school							What should be the primary role of the public school					
WHAT IS NOW							WHAT SHOULD BE					
Agr. Educ.		H'm'g. Educ.		Ind. Educ.		Response Categories	Agr. Educ.		H'm'g. Educ.		Ind. Educ.	
N	%	N	%	N	%		N	%	N	%	N	%
17	35.5	19	22.4	24	46.2	1. The school is an agent primarily concerned with conserving and perpetuating the cultural heritage.	3	6.1	7	8.3	8	16.7
21	43.7	42	49.4	14	26.9	2. The school is an agent primarily concerned with examining and manifesting the existing social order.	18	36.7	17	20.3	13	27.1
10	20.8	24	28.2	14	26.9	3. The school is an agent primarily concerned with reconstructing and redirecting society.	28	57.2	60	71.4	27	56.2
48	100.0	85	100.0	52	100.0		49	100.0	84	100.0	48	100.0
P < .01						Chi-Square	P > .05					

TABLE XIX

RESULTS OF TESTS OF SIGNIFICANCE, SHOWING THE PER CENT OF RESPONDENTS IN EACH SUB-JURY GROUP CHECKING VARIOUS RESPONSE CATEGORIES FOR "WHAT IS NOW" AND "WHAT SHOULD BE" REGARDING THE ROLE OF THE PUBLIC SCHOOL IN AMERICAN SOCIETY

Response Category	Response Groups															
	Agr. Educ.		H'm'g. Educ.		Ind. Educ.		Economists		Soc'l'gsts		Educ. Phil.		Management		Labor	
	I*	S*	I	S	I	S	I	S	I	S	I	S	I	S	I	S
N	48	49	85	84	52	48	42	43	47	47	70	66	42	41	19	18
%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
1	35.5	6.1	22.4	8.3	46.2	16.7	47.6	27.9	51.1	17.0	52.8	1.5	42.8	29.3	47.4	0
2	43.7	36.7	49.4	20.3	26.9	27.1	45.2	39.5	40.4	42.6	42.9	39.4	54.8	43.9	52.6	50.0
3	20.8	57.2	28.2	71.4	26.9	56.2	7.2	32.6	8.5	40.4	4.3	59.1	2.4	26.8	0	50.0
Chi-Square	P < .001		P < .001		P < .01		P < .001		P < .001		P < .001		P < .01		P < .001	

*I = What Is Now *S = What Should Be

Differences among groups for What Is Now significant at .1 per cent level of confidence.
Differences among groups for What Should Be significant at .1 per cent level of confidence.

Response Categories

1. The school is an agent primarily concerned with conserving and perpetuating the cultural heritage.

2. The school is an agent primarily concerned with examining and manifesting the existing social order.

3. The school is an agent primarily concerned with reconstructing and redirecting society.

responses checked were independent of whether respondents were reacting to what is now or what should be the primary role of the school. Each hypothesis was rejected at the 1 per cent or greater level of confidence.

Although Table XIX reports test results showing that there were marked, significant shifts in opinions from what jurors believed is now the role of the school in society to what jurors believed should be the role of the school in society, observation of the data also denotes that there were wide variations in the proportions of sub-juries checking each of the three response categories both for what is now and what should be. Hypotheses to the effect that responses to what is now and what should be the role of the school were independent of sub-juries to which the respondents belonged were tested by the chi-square statistic, and, in both instances, were rejected at the .1 per cent level of confidence. In registering opinions as to the existing role of the school, the proportions of the several sub-juries checking response category one varied from 22.4 per cent for the home-making educators to 52.8 per cent for the educational philosophers. Also with regard to what is now, the respondents in the three vocational education sub-juries were much more likely to select response category three than were the respondents in any of the other five sub-juries.

Proportions of respondents in the several sub-juries checking the categories for what should be the role of the school also varied widely. The proportions checking response category three, for example, ranged from 26.8 per cent for the management sub-jury to 71.4 per cent for the homemaking educators. Respondents included in the three vocational sub-juries and the philosophy of education sub-jury were more likely than respondents in the other four sub-juries to indicate that the school should assume a more dynamic role in reconstructing and redirecting society. The sub-juries representing personnel management and economists were less likely than respondents in the other six sub-juries to indicate the role of the schools should be more dynamic in reconstructing and redirecting society.

CHAPTER IV. SUMMARY

Jurors representing a number of different background orientations which included vocational education, philosophy of education, economics, sociology, management, and labor were queried regarding what is now and what should be (1) the nature of vocational education, (2) the clientele accommodated by vocational education, (3) the importance of vocational education, and (4) the primary role of the school in society. The data were gathered and analyzed to identify underlying conceptions of the various specialists concerning vocational education and the role of the school in society, and these data were used for comparing what is now and what should be viewpoints within and among groups. A major purpose for studying jury opinions regarding vocational education was to assess the possible influence background orientation of jurors may have had with regard to reactions concerning the relevance of trends and the action schools should take in light of the trends in planning for vocational education.

On the basis of the findings included in this chapter, the following generalizations may be made:

1. The response patterns of the total jury concerning what is now and what should be the nature of, the clientele accommodated by, and the importance of vocational education were significantly different.

   a. The conception of jurors regarding the nature of vocational education produced a response pattern indicating that the majority of the jurors viewed present programs as being (1) narrowly conceived and limited to simple skills and related knowledge, or (2) primarily concerned with occupational adjustment for a given vocation. In contrast, conceptions of jurors regarding the desirable nature of future programs produced a marked shift in opinion toward the positions that vocational education should (1) emphasize the relationship between vocational proficiency and societal welfare, or (2) emphasize broad training as a basis for subsequent specialized training at the post high school level.

   b. The conceptions of jurors regarding the clientele accommodated by current programs of vocational education produced a response pattern showing that jurors distributed themselves fairly evenly among the possible response categories. However, when responding to the question regarding clientele that programs should be designed to accommodate, a marked shift occurred with

approximately 79 per cent of the jurors indicating that future programs should be designed to accommodate students interested in and possessing an aptitude for vocational education regardless of their future work or educational plans.

c. The conceptions of jurors regarding the importance of currently operated vocational programs produced a response pattern showing 54 per cent believing the programs were of some importance, and 41.3 per cent believing the programs are now of great importance. Again, there occurred a decided shift in the response pattern with nearly 82 per cent of the respondents indicating that under desirable conditions future programs of vocational education should be of great importance.

2. The significant differences noted among the sub-juries in the response patterns to the 'what is now' and to the 'what should be' questions indicated that the jury was not drawn from a common population.

a. The various disciplines from which the jury was selected was judged to be a contributing factor causing many statistically significant differences to be found when making comparisons.

b. The three sub-groups within the sub-jury of vocational educators was judged to be a contributing factor causing many statistically significant differences to be found which would not be evident in a common population.

3. The response pattern of the total jury concerning 'what is now' and 'what should be' the primary role of the school in society were significantly different.

a. The conception of jurors regarding the primary role of the school as presently functioning produced a response pattern indicating that the majority of the respondents viewed the school as an agent concerned with (1) conserving the cultural heritage or (2) examining and manifesting the existing social order.

b. The conception of jurors regarding what should be the primary role of the schools in society showed a marked shift in the response pattern with 34.8 per cent expressing an opinion that the primary role should be examining and manifesting the social order

and 54 per cent expressing an opinion that the primary role should be one of redirection and reconstruction of society.

4. The response patterns of the jurors concerning conceptions of vocational education and the role of the school in society suggested that background orientation in fact may have influenced opinions regarding relevance of trends and action to be taken in light of the trends.

a. Empirical evidence derived from trend ratings viewed against background orientation of the sub-juries indicated that where on a priori grounds a sub-jury reasonably would be expected to view a trend as being very relevant, the trend ratings were rated by a large majority of these sub-jury members as being highly relevant.

b. Empirical evidence tended to show that a relationship did exist between the proportion of respondents who had indicated the schools should exert accelerating or impeding influence on trends and the proportion of respondents in the sub-juries who believed the school should consider its primary role one of redirecting and reconstructing society.

CHAPTER V

SUMMARY, GENERALIZATIONS, AND CONCLUSIONS

The research problem was concerned with the identification of social, economic, and technical trends related to vocational education, and the ranking of the trends in terms of the extent to which these trends should be considered in planning programs of vocational education. As an adjunct to the study, opinions were analyzed with reference to (1) the nature of vocational education, (2) the clientele to be served, (3) the importance of vocational education, and (4) the primary role of the public school in society.

Three assumptions underlie this research. First, that social diagnosis provides pertinent information for curriculum planning and direction toward translating social reality into educational purposes. Second, that an analysis of societal conditions will serve as a guide for developing a set of criteria for appraising the extent to which existing vocational education programs are relevant in terms of identified societal conditions and trends. Third, the value judgments (opinions) regarding societal conditions and trends may be quantified, and the resultant quantitative data can be analyzed and organized to be used in establishing criteria to be employed in appraising an educational program.

The data-gathering instrument was a questionnaire which contained three parts. Part I contained 55 selected trend items to which jurors indicated (1) the extent to which each trend should be considered in planning future programs of vocational education, and (2) the action, if any, the school should take with regard to the direction of the trend. Part II contained eight items to obtain jury opinion regarding <u>what is now</u> and <u>what should be</u> the nature of vocational education, the clientele served, the importance of vocational education, and the primary role of the public school in our society. Part III included items to collect personal data on the jurors.

The respondents who reacted to the questionnaire were regarded as a jury of specialists. The jury was drawn from leaders in a number of disciplines who are engaged in a continual study of society from diverse frames of reference. Included in the jury sample were specialists in economics, sociology, philosophy of education, vocational education, management and labor. The present chapter is a summary of the findings of the study, which culminates in a set of desirable characteristics of vocational education based on the analyses of social data.

I. PERTINENT TRENDS RELATED TO VOCATIONAL EDUCATION

Ratings of each trend, as appraised by jury members, were summed across items to attain a score for each item indicative of the relative importance of the trend in terms of meriting consideration in planning future programs of vocational education. Intercorrelation of scores assigned by sub-jury groups indicated that the sub-juries were in substantial agreement as to the relative importance of the trend items. Examination of trends ranked highest in importance indicated that these trends may be grouped, for convenience, into three major categories.

Trends Referring to Extension and Expansion of Educational Programs

Foremost among the trends which were ranked highest in importance were those related to the continual expansion and extension of education. A significant trend in American society is that the educational attainment of adults is being extended upward as measured by the average number of years of schooling completed. Directly related to the over-all increase in educational grade level of attainment is the extended number of years youth spend in education prior to entering the labor force.

As the labor market demands more persons with education beyond the high school level, more adults are enrolling in educational programs in the public schools. Further, there is a marked increase in the number of terminal educational programs involving two years of post-high school education. Then, too, colleges and universities are becoming more selective with regard to admission policies which may further stimulate the development of post-high school programs in the local community.

Two additional trends were evident which merit consideration in curriculum planning for vocational education at the high school level. First, the number and per cent of students enrolling in vocational programs in high school are increasing. Secondly, the schools are accepting and performing an increasing number of functions, many of which were formerly vested with other agencies. Thus, persons concerned with and responsible for educational planning must give increased attention to the student population to be served and to the types of educational functions to be performed in programs of vocational education.

Trends Referring to the Level and Nature of Occupational Activity

A pertinent consideration in planning programs of vocational education is the changing nature and level of occupational activity in American society. As technology continues at a rapid pace, the

number of new occupations appearing in business and industry likewise increase rapidly. The ratio of occupations requiring specialized training to occupations requiring little or no training is increasing also. The product of change is reflected in the ratio of persons employed as technicians, craftsmen, and semi-skilled operators, to persons employed as non-skilled laborers. At the same time, an increasing number of training programs is being established in industry designed to prepare, upgrade, and retrain employees in an effort to keep pace with changes. In addition, there is evidence of a tendency to establish special license and certification requirements as prerequisite to pursuing a particular vocation.

The rapidity of technological change undoubtedly is related to and a product of increasing expenditures being made for research and development by industry and agriculture. An apparent effect of research and development is noted in productive efficiency which bears upon the reduction in demand for workers in production. Concomitantly, the ratio of workers engaged in processing, distributing, and providing services to those employed in production is increasing. The changing character of the labor force is reflected also in the increasing number of persons employed in supervisory, managerial, and professional positions.

Specialized training and employment opportunities for handicapped persons are increasing. At the same time, there are indications that healthy workers over 45 years of age are experiencing increasing difficulty in obtaining employment.

Women are becoming a more important factor in the labor force. The number and per cent of women, especially married women, in the labor market is increasing. Further, the range of occupations in which women are employed is being extended.

Trends Referring to the Changing Nature of Social and Economic Patterns

Trends in American society suggest alterations in the pattern of American life, and a number of these trends merit consideration in planning programs of vocational education, according to the judgment of the group of raters. The social and economic life of the nation is becoming more centralized, standardized, and organized into formal patterns. The American people are becoming more security conscious. Rapid changes in American society are accompanied by increased uncertainty in personal values and social direction.

The declining per cent of persons in the labor force engaged in farming is producing marked changes in the patterns of rural economy. Further, there is an increasing per cent of the population classified as "rural-non-farm." These changes in the rural labor

force and population classifications are accompanied by indications that the distinct social and economic characteristics once associated with rural and urban society are diminishing.

There is a trend toward concentrating agricultural and industrial productivity into a smaller number of units of production. The ratio of the number of persons employed by corporations, institutions, and by other persons to the number of self-employed is increasing. Then, too, the management of agriculture and industry is being shifted from owners to managerial persons.

There is a marked tendency toward population mobility in the United States. Within this phenomenon, it is evident that geographic mobility is increasing most rapidly for the highly educated workers.

An outcome of industrial change is the shorter work week. In turn, this condition is reflected in growing expenditures for and participation in leisure time and recreational activities.

American people are becoming increasingly conscious of the problems and practices pertaining to health and safety. The incident of diseases and disorders of a psychological or emotional origin are increasing and this trend is receiving more attention as a major health problem in America. There is a pronounced trend in management to become increasingly concerned about the physical, mental, and emotional welfare and physical comfort and safety of the employees.

II. OPINIONS REGARDING SUGGESTED ACTION TO RELEVANT TRENDS

The relevance of trends for vocational education provides a single dimension to use in curriculum planning. To enlarge the value of relevance, a second dimension that suggests direction or action to be taken is an important corollary. It follows logically that action is a function of relevance. In this context, jurors were requested not only in indicate relevance of trends but to qualify their position by suggesting direction of action to be taken with regard to trends in curriculum planning.

Conceptions of Respondents Regarding School Action to Trends

The differences in relevance of trends suggest an order of concern in curriculum development. However, curriculum implementation cannot be based wholly on differences in relevance, but it is equally dependent upon the action to be taken.

Relationships of degree of relevance to action. As jurors considered trends highly relevant, the more likely were they to suggest that conscious effort should be made by the schools to encourage, or otherwise accelerate the trends, or to discourage, or otherwise impede

the trends. Of the 20 trends ranked highest for relevance, predominate opinion of the jurors was that schools should purposely accelerate 13 and impede 2 of these trends. In contrast, of the 20 trends ranked lowest in terms of relevance, it was found that in only one instance was predominate opinion such that purposeful action to influence the direction of the trend was suggested. In most other instances for the low ranking trends, the response pattern was such that it suggested a majority of the respondents believed the schools should adapt and adjust to the trends without purposely influencing direction. Then, too, it was found that as trends were considered lower in terms of relevance, there was an increase in the per cent of respondents who believed the trend could be disregarded in curriculum planning for vocational education.

Relationship of action to specific trends. If action opinion is an index to be used in making judgments regarding the implementation of trends in curriculum planning, the variations of the response patterns for each trend need careful study. Opinion data, particularly when drawn from diverse frames of reference, must be viewed judiciously against an independent set of circumstances confronting the curriculum planner. There are certain trends, as evidenced from a study of the action data, which were so much a matter of fact or universal to the cultural pattern, that expressing value judgments introduced less cause for variations in response. In other instances, however, where the trend items tended to present cultural alternatives or depart from commonly accepted ideas or practices, greater variance became apparent in the expressions of value judgments with regard to action for curriculum implementation. Hence, each trend and the suggested action should be viewed independently to determine the degree to which the trend is a universal element or an alternative element in the cultural pattern.

III. BASIC CONCEPTS HELD REGARDING VOCATIONAL EDUCATION

While it was held to be important to obtain the views of jurors on pertinent trends potentially related to vocational education, it was likewise held to be important to discover their viewpoints regarding certain basic concepts concerning vocational education. Peoples' value judgments normally are qualified by their background orientations. The community of particular interest to which people may belong obviously affects their opinions, therefore, these data pertaining to underlying concepts regarding vocational education provide some insight into the frames of reference from which judgments were made. Thus, a basis was established for relating jurors reactions to the relevance of trends or to the suggested action schools should take with regard to the trends to jurors conceptions of vocational education.

Concepts Held Regarding Present and Desired Patterns of Vocational Education

The jury, as a group of specialists representing vocational education, economics, sociology, philosophy of education, management, and labor, brought together a cross section of background orientations for the major purposes of (1) indicating the relevance of trends, and (2) indicating action to be taken by the schools in planning for vocational education. Judgments made concerning relevance and action become more meaningful when viewed against conceptions held regarding what is now and what should be the nature, the clientele, and the importance of vocational education.

Opinions of Respondents Regarding What is Now the Nature of, the Clientele Accommodated by, and the Importance of Vocational Education. Predominate opinion among the jurors pointed toward a conception that programs of vocational education were narrowly designed to emphasize simple skill training and related knowledge or limited to occupational adjustment for a given occupation.

Conceptions of jurors regarding the clientele present programs of vocational education were designed to accommodate revealed considerable diversity of opinion among the various sub-juries. Other than for the vocational education sub-jury, the majority of the respondents tended to believe that vocational programs were designed for students who cannot meet academic standards or students who view high school education as terminal. On the other hand, the majority of the members of the vocational education sub-jury believed current programs of vocational education were designed in accordance with interests and abilities of students in order to accommodate a diverse clientele.

Related to conceptions regarding the nature of and clientele accommodated by current programs of vocational education, majority opinion in the vocational education sub-jury was that vocational education was of great importance, whereas majority opinion in all other sub-juries was that vocational education was of some importance.

Opinions of Respondents Regarding 'What Should be' the Nature of, the Clientele Accommodated by, and the Importance of Vocational Education. Predominate opinion among the jurors concerning the desirable nature of vocational education pointed toward a conception that programs should be designed to emphasize the relationship between occupational proficiency and societal welfare or designed broadly to serve as a basis for subsequent post-high school vocational training.

Conceptions of jurors regarding clientele for whom future programs should be designed resulted in a response pattern skewed decidedly toward a position that programs should be designed to accommodate all students who possess aptitude and have interest regardless of their future educational plans.

Under desirable conditions, more than four-fifths of all respondents believed that vocational education should be of great importance.

Differences evident in conceptions of sub-juries when reacting to 'what is now' and 'what should be' patterns of vocational education. Predominate responses as to what is now and what should be regarding the nature, clientele and importance of vocational education indicated considerable similarity in the form of the response patterns. When, however, the response patterns of the various sub-juries for what is now and for what should be were examined, it became evident that the sub-juries had not reacted from a common frame of reference. Thus, it can be concluded that the sub-juries were not drawn from a common population. A significant finding which merits consideration of educational planners was the decided shift in the response pattern from what is now to what should be for each of the sub-juries and for the total jury. Stated otherwise, regardless of existing conceptions as evidenced by predominate opinion of a particular sub-jury regarding vocational education, the shift in the pattern of response in every instance was toward a conception of a broader program of vocational education accommodating a wider range of students, and therefore, warranting a rating of higher importance in the total school program.

Concepts Held Regarding the Present and Desired Primary Role of the School

Conceptions of the jurors regarding what is now the primary role of the school present a response pattern that views the school as an agent functioning to conserve and perpetuate the cultural heritage or primarily concerned with examining and manifesting the existing social order. In contrast, opinions shift to the point where in the future more than one-half of the jurors believed the school should be a more forceful agency with a primary concern for reconstructing and redirecting society. Although opinion shifted markedly away from the position that the school should be primarily an agency concerned with the conservation of the cultural heritage, the position that the school should be primarily concerned with examining and manifesting the existing social order was supported as the desirable role by one-third of the jurors.

IV. A CONTEMPORARY DESIGN FOR VOCATIONAL EDUCATION

This section presents a contemporary design for vocational education based on the findings of the study. The design includes ten characteristics of socially adapted programs of vocational education which may be used in curriculum development or for educational appraisal.

1. Programs of vocational education should be based on the increasing complexity and range of the occupational structure, and should include instructional activities which challenge and meet the

needs of students with a wide range of scholastic and special aptitudes and interests.

2. Programs of vocational education should be broadly conceived, and should include instructional activities designed to facilitate initial entrance into the labor force as well as to develop an adequate background upon which subsequent specialized training may be based.

3. Programs of vocational education should be organized to emphasize broad technical and scientific understandings, and should include instructional activities designed to permit the application of technical knowledge and understanding to practical occupational situations.

4. Programs of vocational education should be designed to encourage the development of appreciations and understandings of the economic and social contributions of occupations to society, together with the development of favorable attitudes toward occupations, and, further, should be designed to develop the dynamic leadership qualities needed to reconstruct and redirect societal conditions under which the individual is to work.

5. Programs of vocational education should be oriented toward the increasing importance of managerial behavior in modern society, and should include instructional activities designed to emphasize reflective thinking, problem solving, and creativity in work, as well as in the organization of human and material resources into efficient and effective service and production units.

6. Programs of vocational education should be organized to emphasize the abilities essential in human relations and occupational adjustment, with special emphasis on developing, understanding, and appreciating the social importance of personal traits pertaining to work habits, interpersonal relations, and employer-employee relations.

7. Programs of vocational education should be organized to include adequate guidance services related to all phases of occupational adjustment, including assistance in selecting, preparing for, entering into and adjusting to changes in occupational activity.

8. Programs of vocational education should include specialized training designed to facilitate occupational mobility both vertically (upgrading of occupational activity) and horizontally (retraining for new or different occupations at a constant level of occupational activity) for established workers.

9. Programs of vocational education should be organized to emphasize the development of abilities and attitudes designed to promote emotional maturity, economic security, and physical well-being and safety.

10. Programs of vocational education should be organized to emphasize the development of abilities related to occupational endeavor which may be utilized as leisure-time activities.

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APPENDICES

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APPENDIX A

PURDUE UNIVERSITY
DIVISION OF EDUCATION
Lafayette, Indiana

November, 1958

Dear Colleague:

Will you help in a study of the relevance of social, economic, and technical trends to vocational education by filling out and returning the attached questionnaire? The study is being conducted by Purdue University in fulfillment of a contract with the Research Section of the U. S. Office of Education. A stamped, self-addressed envelope is enclosed for your convenience.

Your responses require only a circle or a check mark, and will take very little of your time. Pretests of the instrument indicate that the entire questionnaire may be completed in approximately 25 minutes. The instrument is divided into three phases, with a total of 67 items included in the questionnaire. The information you give us will be kept confidential, and will be reported only in the form of statistical summaries. We are not asking you to sign this instrument, but have numbered the questionnaires so that we can keep track of them as they are returned.

The present study is concerned with (1) the nature of vocational education that should be offered in secondary schools in light of contemporary social, economic, and technical conditions and trends, and (2) the extent to which vocational programs are serving members of American society in an era characterized by changes.

Our staff has surveyed the pertinent literature, and has prepared a list of trends potentially related to vocational education. Now we are turning to persons engaged in a continual study of society from diverse frames of reference, to leaders in a number of recognized fields, to obtain reactions regarding the extent to which the identified trends should be considered in planning vocational programs, and the direction of emphasis the American public school should take with respect to these trends.

Thank you for the time and thought we know you will give this questionnaire. May we have your responses soon?

PROJECT DIRECTORS

F. J. Woerdehoff
E. J. Kalsem
J. E. Coster
Cooperative Project No. 385
1/Publ/VOC/11-58

PURDUE UNIVERSITY
DIVISION OF EDUCATION
LAFAYETTE, INDIANA

VOCATIONAL EDUCATION IN PUBLIC SCHOOLS AS RELATED TO SOCIAL, ECONOMIC, AND TECHNICAL TRENDS

APPRAISING TRENDS

I. ANALYSIS OF TRENDS

DIRECTIONS:

Following is a list of trends related to social, economic, and technical conditions in our society. Please read each trend carefully, and respond to two basic questions. The first question is:

A. TO WHAT EXTENT SHOULD EACH TREND BE CONSIDERED IN PLANNING FUTURE PROGRAMS OF VOCATIONAL EDUCATION?

In responding to this question, we would like for you to express your judgement of the pertinency or relevancy of each trend to future vocational programs in public schools by selecting one of five possible responses:

1. No Extent (NE): This trend is irrelevant, and never not be considered in planning vocational programs.
2. Limited Extent (LE): Trend is of little importance and should receive only minor consideration.
3. Moderate Extent (ME): Trend is of average importance, and should receive reasonable consideration.
4. Considerable Extent (CE): Trend is quite important and should receive major consideration.
5. Very Great Extent (VG): Trend is extremely pertinent and should receive major consideration.

Select the response category which most nearly expresses your own judgement, and encircle the corresponding response symbol. Then, consider the second question:

B. HOW SHOULD THE PUBLIC SCHOOL REACT WITH REGARD TO EACH TREND?

In responding to this question, you are requested to make a judgement concerning the desirability of the trend in terms of potential influence on American society. Then, assuming the school can participate effectively in the direction of society through the curriculum, indicate the action, if any, the school should take with regard to the direction of the trend. Four response categories are provided:

1. Impede (I): This trend is inconsistent with the best interest of American society, and schools should develop programs to discourage, decelerate, depress, and hinder the progress of the trend.
2. Accelerate (A): This trend is highly consistent with the best interests of American society, and the schools should develop programs to encourage, strengthen, promote, and extend the progress of this trend.
3. Neither Impede nor Accelerate (N): This trend is recognized, and schools should develop programs to adapt, fit, and adjust to the trend without purposely influencing direction.
4. Disregard (D): This trend is of such nature that schools may disregard it in planning educational programs.

Again, select the response category with which you agree most closely, and encircle the corresponding response symbol.

CODE: NE - NO EXTENT LE - LIMITED EXTENT ME - MODERATE EXTENT CE - CONSIDERABLE EXTENT VG - VERY GREAT EXTENT	I - IMPEDE A - ACCELERATE N - NEITHER IMPEDE NOR ACCELERATE D - DISREGARD	A TO WHAT EXTENT SHOULD THIS TREND BE CONSIDERED?	B HOW SHOULD THE SCHOOL REACT TO EACH TREND?
CIRCLE ONE		1 2 3 4 5	1 2 3 4
1. Purchasing habits of the American people are changing, with use of credit buying and long-term payments increasing		NE LE ME CE VG	I A N D
2. The percentage of the total population claiming affiliation with a religious organization is increasing		NE LE ME CE VG	I A N D
3. The number of years youth spend in education prior to entering the labor force is increasing.		NE LE ME CE VG	I A N D
4. Expenditures for research and development in agriculture and industry are expanding rapidly . .		NE LE ME CE VG	I A N D
5. America is moving progressively toward a homogeneous "middle class" society		NE LE ME CE VG	I A N D
6. Differences in social and economic characteristics of rural and urban groups are diminishing .		NE LE ME CE VG	I A N D
7. The ratio of number of persons employed by corporations, institutions, and other persons to the number of self-employed persons is increasing		NE LE ME CE VG	I A N D
8. The ratio of occupations requiring specialized training to occupations requiring little or no training is increasing		NE LE ME CE VG	I A N D
9. The percentage of persons in the labor force who are members of organized labor unions is increasing		NE LE ME CE VG	I A N D
10. The percentage of the population dependent upon incomes from pensions, annuities, and Social Security is increasing		NE LE ME CE VG	I A N D
11. The percentage of persons in the labor force employed in supervisory, managerial, and professional positions is increasing		NE LE ME CE VG	I A N D
12. The number of occupations for which licenses or certificates are required is increasing		NE LE ME CE VG	I A N D
13. The number of terminal education programs involving two years of post high school education is increasing		NE LE ME CE VG	I A N D
14. The center of population is shifting towards western and southwestern regions of the United States		NE LE ME CE VG	I A N D
15. The proportion of land used for purposes other than farming (e.g., transportation, industry, and recreation) is increasing		NE LE ME CE VG	I A N D
16. The percentage of the total national income received by agriculture is declining		NE LE ME CE VG	I A N D

Please turn page.

CODE: NE - NO EXTENT LE - LIMITED EXTENT ME - MODERATE EXTENT CE - CONSIDERABLE EXTENT VG - VERY GREAT EXTENT	I - IMPEDE A - ACCELERATE N - NEITHER IMPEDE NOR ACCELERATE D - DISREGARD	A TO WHAT EXTENT SHOULD THIS TREND BE CONSIDERED?	B HOW SHOULD THE SCHOOL REACT TO EACH TREND?
	CODES	A	B
17. The percentage of students in public secondary schools enrolled in vocational education programs is increasing		NE LE ME CE VG	I A N D
18. Expenditures for and participation in leisure time and recreational activities are increasing.		NE LE ME CE VG	I A N D
19. The agricultural and industrial productivity of the nation gradually is being concentrated into a relatively small number of units of production		NE LE ME CE VG	I A N D
20. The percentage of the population classified as "rural-non-farm" is increasing		NE LE ME CE VG	I A N D
21. Management is becoming increasingly concerned about the physical, mental, and emotional welfare and physical comfort and safety of the employee		NE LE ME CE VG	I A N D
22. The incidence of illnesses and disorders of a psychological or emotional origin is increasing and is receiving more attention as a major health problem in America		NE LE ME CE VG	I A N D
23. The number of new occupations, resulting from technological developments in business, industry and agriculture is increasing		NE LE ME CE VG	I A N D
24. The percentage of adults enrolled in educational programs in public schools is increasing		NE LE ME CE VG	I A N D
25. The schools are performing and accepting major responsibilities for an increasing number of functions which formerly were vested with the home, church, and other agencies		NE LE ME CE VG	I A N D
26. The ratio of the number of persons engaged in processing, distributing, and providing services to the number of persons engaged in production is increasing		NE LE ME CE VG	I A N D
27. The percentage of the total income received by the middle 60 per cent of income recipients is increasing slightly		NE LE ME CE VG	I A N D
28. The percentage of youth who serve in military service prior to entering the labor force is increasing		NE LE ME CE VG	I A N D
29. The range of occupations in which women are employed is increasing		NE LE ME CE VG	I A N D
30. The percentage of persons in the labor force who are employed on a second job, either part-time or full-time, is increasing		NE LE ME CE VG	I A N D
31. The American people are becoming increasingly security conscious and are participating more extensively in plans for pensions, health and life insurance, and social welfare programs provided by industry and government		NE LE ME CE VG	I A N D

Please turn page.

CODE: NE - NO EXTENT LE - LIMITED EXTENT ME - MODERATE EXTENT CE - CONSIDERABLE EXTENT VG - VERY GREAT EXTENT	I - IMPEDE A - ACCELERATE N - NEITHER IMPEDE NOR ACCELERATE D - DISREGARD	A TO WHAT EXTENT SHOULD THIS TREND BE CONSIDERED?	B HOW SHOULD THE SCHOOL REACT TO EACH TREND?
COLUMN		1 2 3 4 5	1 2 3 4
32. Persons over 45 years of age are experiencing increasing difficulty in obtaining employment		NE LE ME CE VG	I A N D
33. The number and percentage of women, especially married women, in the total labor force is increasing		NE LE ME CE VG	I A N D
34. Training programs in industry designed to prepare, upgrade, and retrain persons for employment are increasing		NE LE ME CE VG	I A N D
35. The number of persons over 65, who are not gainfully employed, is increasing		NE LE ME CE VG	I A N D
36. Sources of value patterns of American people are changing from foundations in eternal value to foundation in social usage		NE LE ME CE VG	I A N D
37. The political life of the nation is becoming more centralized and organized into formal bureaucratic patterns		NE LE ME CE VG	I A N D
38. The percentage of the labor force in farming is declining		NE LE ME CE VG	I A N D
39. Geographical mobility is increasing for highly educated workers		NE LE ME CE VG	I A N D
40. Interest patterns of family members are becoming increasingly varied and oriented towards groups and activities outside the home		NE LE ME CE VG	I A N D
41. The utilization of synthetic products, low grade materials, and by-products is increasing		NE LE ME CE VG	I A N D
42. The management of agricultural and industrial productivity is being shifted gradually from owners to managerial persons		NE LE ME CE VG	I A N D
43. The average number of years of schooling completed by adults in the total population is gradually increasing		NE LE ME CE VG	I A N D
44. Interest in and acceptance of improved dietary practices and higher levels of nutrition (e.g., high protein diet, vitamins, calorie content) are increasing		NE LE ME CE VG	I A N D
45. The demand for persons with education beyond the high school level is increasing		NE LE ME CE VG	I A N D
46. American colleges and universities are becoming more selective with regard to admission policies.		NE LE ME CE VG	I A N D
47. Secondary groups (e.g., lodges, clubs, and unions) are becoming increasingly important to individuals, and are claiming a larger share of individual time, energies, and loyalties		NE LE ME CE VG	I A N D

Please turn page.

CODE: NE - NO EXTENT LE - LIMITED EXTENT ME - MODERATE EXTENT CE - CONSIDERABLE EXTENT VG - VERY GREAT EXTENT	I - IMPEDE A - ACCELERATE N - NEITHER IMPEDE NOR ACCELERATE D - DISREGARD	TO WHAT EXTENT SHOULD THIS TREND BE CONSIDERED?	HOW SHOULD THE SCHOOL REACT TO EACH TREND?
COLUMN		1 2 3 4 5	1 2 3 4
48. The social and economic life of the nation is becoming more centralized, standardized, and organized into formal patterns		NE LE ME CE VG	I A N D
49. The ratio of disposable income to total income is declining, with taxes taking a higher percentage of total income		NE LE ME CE VG	I A N D
50. The range and scope of family activities and occupational opportunities (due in part to increased units of private transportation) are expanding		NE LE ME CE VG	I A N D
51. The American people are becoming increasingly conscious of problems and practices pertaining to health and safety		NE LE ME CE VG	I A N D
52. The ratio of persons in the labor force employed as craftsmen (skilled), operatives (semi-skilled), and technicians to persons employed as unskilled laborers is increasing		NE LE ME CE VG	I A N D
53. Specialized training and employment opportunities for handicapped persons are increasing . .		NE LE ME CE VG	I A N D
54. Individuals are becoming increasingly more dependent on secondary (second-hand) media of communication as sources for interpretation of information		NE LE ME CE VG	I A N D
55. Rapid social, economic, and technological changes in American society are engendering increased uncertainty in personal values and social direction		NE LE ME CE VG	I A N D

COMMENTS:

II. QUESTIONS REGARDING VOCATIONAL EDUCATION

WHAT IS NOW

DIRECTIONS: Questions 56, 57, and 58 deal with existing programs of vocational education, and question 59 deals with the existing primary role of the public schools. May we have your reaction to each question by checking the response which most nearly expresses your own position.

WHAT SHOULD BE

DIRECTIONS: Questions 60, 61, and 62 call for responses which indicate your judgement as to desirable or optimum programs of vocational education. Question 63 refers to what should be the appropriate primary role of the school. Please check the response which indicates most closely your own position.

WHAT IS NOW

56. Nature of Present Programs of Vocational Education. In your judgement, which of the following statements most nearly describes the nature of programs of vocational education as currently practiced in our high schools?

___1. An educational program emphasizing the acquisition of simple manual skills and related knowledge requisite to fitting persons for useful employment.

___2. An educational program emphasizing occúpational adjustment, with special reference to selecting an occupation, developing abilities and understandings, and progressing in a vocation.

___3. An educational program emphasizing the relationship between vocational proficiency and societal welfare, with special reference to occupational information, preparation, and adjustment.

___4. An educational program, general in nature, emphasizing knowledge and understandings sufficiently broad to serve as a basis for subsequent specialized training at post high school level.

___5. Other (Specify.)_____
_____

57. Students: Present Vocational Programs are Designed to Accommodate. In your judgement, which of the following groups most nearly describes the clientele current programs of vocational education are designed to accommodate in our high schools?

___1. Students who cannot or will not meet standards for academic programs and who are likely to leave high school before graduation.

___2. Students who plan to graduate from high school and obtain employment immediately after graduation.

___3. Students who may or may not continue education beyond high school, but who are interested in and possess aptitude for occupations for which preparation is offered at the high school level.

___4. Other (Specify.)_____
_____

WHAT SHOULD BE

60. Nature of Future Programs of Vocational Education. In your judgement, which of the following statements most nearly describes what you believe should be the nature of future programs of vocational education in our high schools?

___1. An educational program emphasizing the acquisition of simple manual skills and related knowledge requisite to fitting persons for useful employment.

___2. An educational program emphasizing occupational adjustment, with special reference to selecting an occupation, developing abilities and understandings, and progressing in a vocation.

___3. An educational program emphasizing the relationship between vocational proficiency and societal welfare, with special reference to occupational information, preparation, and adjustment.

___4. An educational program, general in nature, emphasizing knowledge and understandings sufficiently broad to serve as a basis for subsequent specialized training at post high school level.

___5. Other (Specify.)_____
_____

61. Students: Future Vocational Programs Should be Designed to Accommodate. In your judgement, which of the following groups do you believe future programs of vocational education should be designed to accommodate in our high schools?

___1. Students who cannot or will not meet the standards for academic programs and who are likely to leave high school before graduation.

___2. Students who plan to graduate from high school and obtain employment immediately after graduation.

___3. Students who may or may not continue education beyond high school, but who are interested in and possess aptitude for occupations for which preparation is offered at the high school level.

___4. Other (Specify.)_____
_____

Please turn page.

II. Questions Regarding Vocational Education, Con't.

WHAT IS NOW

58. Importance of Present Programs of Vocational Education. In view of your responses to 56 and 57, how do you evaluate the importance of vocational education as it is currently operated in our public schools?

___1. Of little or no importance.

___2. Of some importance.

___3. Of great importance.

59. In your judgement, what is the existing primary role of the public school in our democratic society?

___1. The school is an agent primarily concerned with conserving and perpetuating the cultural heritage.

___2. The school is an agent primarily concerned with examining and manifesting the existing social order.

___3. The school is an agent primarily concerned with reconstructing and redirecting society.

___4. Other (Specify.)_____

WHAT SHOULD BE

62. Importance of Vocational Education Under Desired Conditions. In view of your responses to items 60 and 61, how would you evaluate the importance of vocational programs as they should be operated in our public schools?

___1. Of little or no importance.

___2. Of some importance.

___3. Of great importance.

63. In your judgement, what should be the appropriate primary role of the public school in our democratic society?

___1. The school should be an agent primarily concerned with conserving and perpetuating the cultural heritage.

___2. The school should be an agent primarily concerned with examining and manifesting the existing social order.

___3. The school should be an agent primarily concerned with reconstructing and redirecting society.

___4. Other (Specify.)_____

III. PERSONAL DATA

DIRECTIONS: In these last four items, please provide us with the personal data requested.

64. What is the title of your present position?_____

65. What is the general nature of your present position? (Check the response category that best describes your position.)

___1. Teaching
___2. Research
___3. Administration
___4. Public Relations
___5. Program Develo
___6. Other (Specify.)_____

66. Would you like to receive a summary of the findings? Yes_____ No_____

67. Indicate the highest level of schooling that you attained:

___1. High School
___2. Some College
___3. Bachelor's Degree
___4. Master's Degree
___5. Doctor's Degree

COMMENTS:

APPENDIX B

OPINIONS OF RESPONDENTS CONCERNING RELEVANCE OF FIFTY-FIVE TRENDS AND RESULTS OF STATISTICAL TESTS (PART A) AND HOW SCHOOLS SHOULD REACT TO EACH TREND (PART B) SHOWING THE PER CENT CHECKING EACH RESPONSE CATEGORY FOR THE EIGHT SUB-JURIES*

TREND RANK	TREND NUMBER	SCALE VALUES A-Relevance B-Action	Agricultural Educators	Homemaking Educators	Industrial Educators	Economists	Sociologists	Educational Philosophers	Management Personnel	Labor Personnel	TOTALS	Chi-Square Tests
I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
	Number		54	88	58	48	49	74	45	20	436	
1	8	The ratio of occupations requiring specialized training to occupations requiring little or no training is increasing.										IV-VI NS
	A. Relevance											
		N-LE	5.6	2.3	3.4	2.1	2.0	2.7	0	0	2.5	IV-XI
		ME	3.7	12.5	10.3	10.4	4.1	6.8	8.9	5.0	8.2	NS
		C-VGE	90.7	85.2	86.3	87.5	93.9	90.5	91.1	95.0	89.3	
	B. Action											
		I	0	3.5	0	0	0	2.7	6.6	0	1.8	
		A	68.5	59.3	60.3	54.2	36.8	54.1	46.7	55.0	55.1	
		N	29.6	36.0	39.7	43.7	61.2	40.5	46.7	40.0	41.5	
		D	1.9	1.2	0	2.1	2.0	2.7	0	5.0	1.6	

*LEGEND

(III) Scale Values: Relevance: (1) N-LE=No Extent to Limited Extent; (2) ME=Moderate Extent; (3) C-VGE=Considerable to Very Great Extent; Action: (1) I=Impede; (2) A=Accelerate; (3) N=Neither Impede or Accelerate; (4) D=Disregard

(XIII) Chi-Square Tests: IV - VI = Test applied to three vocational education sub-jury groups; IV - XI = Test applied to the eight sub-jury groups.

APPENDIX B (Continued)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
	Number		53	88	58	48	49	74	45	20	435	
2	3	The number of years youth spend in education prior to entering the labor force is increasing.										
	A. Relevance											IV-VI NS
		E-LE	5.7	0	3.4	6.2	2.0	4.0	0	0	2.8	IV-XI NS
		ME	7.5	5.7	8.6	12.5	10.3	16.3	8.9	10.0	9.9	
		C-VGE	86.8	94.3	88.0	81.3	87.7	79.7	91.1	90.0	97.3	
	B. Action											
		I	0	0	5.3	0	12.3	2.7	2.2	0	2.7	
		A	75.9	78.5	66.7	60.4	55.1	58.1	73.3	85.0	68.3	
		N	24.1	21.5	28.0	35.4	28.5	25.5	24.5	10.0	27.8	
		D	0	0	0	4.2	4.1	13.7	0	5.0	1.2	

APPENDIX B (Continued)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
	Number		54	88	58	48	49	75	45	20	437	
3	23	The number of new occupations resulting from technological developments in business, industry, and agriculture is increasing.										
	A. Relevance											IV-VI NS
		E-LE	3.7	1.1	0	4.2	6.1	2.7	6.7	5	3.2	IV-XI NS
		ME	14.8	8	5.2	16.7	10.2	6.7	5.6	10	10.3	
		C-VGE	81.5	90.9	94.8	79.2	83.7	90.6	77.7	85	86.5	
	B. Action											
		I	0	0	0	0	0	1.3	0	0	.2	
		A	68.4	76.1	62.1	43.7	40.8	53.3	62.2	50	59.3	
		N	27.7	23.9	37.9	56.3	57.1	42.7	33.4	50	39.1	
		D	1.9	0	0	0	2.1	2.7	4.4	0	1.4	

APPENDIX B (Continued)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
Number			54	88	58	48	49	75	45	20	437	
4	45	The demand for persons with education beyond the high school level is increasing.										IV-VI .05
A.	Relevance											
		N-LE	7.4	0	5.2	6.2	0	4.0	0	5.0	3.2	IV-XI .01
		ME	5.6	2.3	10.3	14.6	16.3	18.7	24.4	15.0	12.4	
		C-VGE	87.0	97.7	84.5	79.2	83.7	77.3	76.5	80.0	84.4	
B.	Action											
		I	0	0	0	2.1	4.0	1.3	0	5.0	1.1	
		A	90.7	92.0	77.6	72.9	63.3	80.0	75.6	70.0	79.9	
		N	7.4	8.0	22.4	25.0	30.7	17.4	24.4	25.0	18.3	
		D	1.9	0	0	0	2.0	1.3	0	0	.7	

APPENDIX B (Continued)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
Number			54	87	58	48	49	75	45	20	436	
5	52	The ratio of persons in the labor force employed as craftsmen (skilled), operatives (semi-skilled), and technicians to persons employed as unskilled laborers is increasing.										IV-VI NS
A.	Relevance											
		N-LE	7.4	3.4	0	6.2	6.1	6.7	6.7	5.0	5.0	IV-XI NS
		ME	9.2	12.6	12.1	25.0	16.3	18.7	24.4	15.0	16.3	
		C-VGE	83.3	83.9	87.9	68.7	77.6	74.7	68.9	80.0	78.7	
B.	Action											
		I	0	0	0	0	0	1.4	0	0	.2	
		A	81.5	67.8	70.7	68.7	67.3	60.8	60.0	75.0	68.0	
		N	18.5	31.0	27.6	29.2	30.7	36.5	37.8	25.0	30.1	
		D	0	1.2	1.7	2.1	2.0	1.3	2.2	0	1.4	

APPENDIX B (Continued)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
Number			54	88	58	48	49	75	45	20	437	
6	24	The percentage of adults enrolled in educational programs in public schools is increasing.										IV-VI NS
A.	Relevance											
		N-LE	7.4	2.3	1.7	10.4	4.1	8.0	15.6	15.0	6.9	IV-XI .001
		ME	9.3	4.5	8.6	20.8	26.5	24.0	22.2	15.0	15.6	
		C-VGE	83.3	93.2	89.7	68.8	69.4	68.0	62.2	70.0	77.5	
B.	Action											
		I	0	0	0	2.1	2.0	0	0	0	.5	
		A	90.7	93.2	93.1	83.3	87.8	89.3	86.7	85.0	89.4	
		N	9.3	6.8	6.9	12.5	10.2	8.0	13.3	15.0	9.4	
		D	0	0	0	2.1	0	2.7	0	0	.7	

APPENDIX B (Continued)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
Number			54	87	58	48	48	74	45	20	434	
7	4	Expenditures for research and development in agriculture and industry are expanding rapidly.										IV-VI .05
A.	Relevance											
		N-LE	11.2	2.3	3.4	8.3	3.4	4.1	4.4	10.0	5.3	IV-XI .05
		ME	1.8	10.3	17.2	29.1	10.4	21.6	13.3	5.0	14.3	
		C-VGE	87.0	87.4	79.4	62.6	86.2	74.3	82.3	85.0	80.4	
B.	Action											
		I	0	0	0	0	2.1	0	0	0	.2	
		A	76	82.8	72.4	47.9	77.1	71.6	82.3	75	73.7	
		N	24.0	16.1	25.9	52.1	16.6	27.0	13.3	25.0	24.5	
		D	0	1.1	1.7	0	4.2	1.4	4.4	0	1.6	

APPENDIX B (Continued)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
Number			54	88	58	48	49	75	44	20	436	
8	13	The number of terminal education programs involving two years of post high school education is increasing.										IV-VI NS
	A. Relevance											
		M-LE	13	5.7	7	8.3	4.1	5.3	11.4	5	7.3	IV-XI NS
		ME	7.4	17	7	25	16.3	12	13.6	35	14.9	
		C-VOE	79.6	77.3	86	66.7	79.6	82.7	75	60	77.8	
	B. Action											
		I	0	0	3.4	4.2	4.2	4	2.3	5	2.5	
		A	85.2	69	81	64.6	70.8	84	79.5	60	75.6	
		N	12.9	29.8	15.6	27.0	22.9	12.0	15.9	35.0	20.5	
		D	1.9	1.2	0	4.2	2.1	0	2.3	0	1.4	

APPENDIX B (Continued)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
Number			54	88	58	47	49	74	45	19	434	
9	17	The percentage of students in public secondary schools enrolled in vocational education programs is increasing.										IV-VI NS
	A. Relevance											
		M-Le	9.3	5.7	6.9	6.4	8.2	4.1	8.9	5.3	6.7	IV-XI NS
		ME	16.7	8.0	17.2	31.9	16.3	21.6	28.9	5.3	18.2	
		C-VOE	74.0	86.3	75.9	61.7	75.5	74.3	62.2	89.4	75.1	
	B. Action											
		I	3.7	2.3	1.7	19.1	14.6	21.6	13.3	21.1	10.9	
		A	64.8	78.4	84.5	27.6	39.6	33.8	60.0	47.4	56.8	
		N	27.8	19.3	12.1	53.3	43.7	41.9	26.7	26.3	30.7	
		D	3.7	0	1.7	0	2.1	2.7	0	5.2	1.6	

APPENDIX B (Continued)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
Number			54	88	58	48	49	75	45	20	437	
10	29	The range of occupations in which women are employed is increasing.										IV-VI .001
	A. Relevance											
		N-LE	13.0	0	3.3	14.6	8.2	6.7	11.1	5.0	7.1	IV-XI .001
		ME	22.2	6.8	14.0	29.2	16.3	24.0	48.9	20.0	21.1	
		C-VGE	64.8	93.2	82.7	56.2	75.5	69.3	40.0	75.0	72.0	
	B. Action											
		I	1.9	1.3	3.4	0	4.1	1.3	0	0	1.6	
		A	25.9	67.0	50.0	43.7	53.1	52.0	31.1	40.0	48.2	
		N	70.3	31.0	46.6	52.1	40.8	45.4	66.2	55.0	48.6	
		D	1.9	0	0	4.2	2.0	1.3	2.2	5.0	1.6	

APPENDIX B (Continued)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
Number			54	88	58	48	49	75	45	20	437	
11	46	American colleges and universities are becoming more selective with regard to admission policies.										IV-VI NS
	A. Relevance											
		N-LE	11.1	2.3	12.1	12.5	10.2	9.3	4.4	0	8.0	IV-XI NS
		ME	16.7	11.4	17.2	18.7	24.5	21.3	15.6	30.0	18.1	
		C-VGE	72.2	86.4	70.7	68.7	65.3	69.3	80.0	70.0	73.9	
	B. Action											
		I	7.4	5.7	6.9	10.4	12.5	21.6	8.9	45.0	12.2	
		A	44.4	67.0	39.6	54.2	52.1	44.6	75.6	20.0	52.4	
		N	46.3	26.1	51.8	33.4	35.4	29.8	13.3	35.0	33.6	
		D	1.9	1.2	1.7	2.0	0	4.0	2.2	0	1.8	

APPENDIX B (Continued)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
Number			54	88	58	48	49	75	45	20	437	
12	34	Training programs in industry designed to prepare, upgrade, and retrain persons for employment are increasing.										IV-VI NS
		A. Relevance										
		N-LE	13.0	5.7	1.7	18.8	4.1	13.3	20.0	5.0	10.1	IV-XI .001
		ME	14.8	13.6	15.5	33.3	22.4	24.0	48.9	25.0	23.1	
		C-VGE	72.2	80.7	82.8	47.9	73.5	62.7	31.1	70.0	66.8	
		B. Action										
		I	0	0	0	2.1	0	0	0	0	.2	
		A	57.4	79.5	75.9	72.9	69.4	80.0	62.2	75.0	72.5	
		N	38.9	17.1	24.1	16.7	28.6	20.0	35.6	15.0	24.3	
		D	3.7	3.4	0	8.3	2.0	0	2.2	10.0	3.0	

APPENDIX B (Continued)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
Number			54	87	57	48	49	75	45	20	435	
13	26	The ratio of the number of persons engaged in processing, distributing, and providing services to the number of persons engaged in production is increasing.										IV-VI NS
		A. Relevance										
		N-LE	11.1	4.6	3.5	8.3	8.2	4.0	8.9	10.0	6.7	IV-XI NS
		ME	14.8	18.4	19.3	35.4	30.6	20.0	31.1	15.0	22.8	
		C-VGE	74.1	77.0	77.2	56.3	61.2	76.0	60.0	75.0	70.6	
		B. Action										
		I	1.9	12.6	0	2.1	6.1	9.3	0	5.0	5.7	
		A	29.6	18.4	1.7	25.0	14.3	13.3	17.8	15.1	22.0	
		N	64.8	66.7	41.4	70.8	71.4	76.1	77.8	75.0	69.3	
		D	3.7	2.3	56.9	2.1	8.2	1.3	4.4	5.0	3.0	

APPENDIX B (Continued)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
Number			54	88	58	48	49	75	45	20	437	
14	43	The average number of years of schooling completed by adults in the total population is gradually increasing.										
		A. Relevance										IV-VI .05
		N-LE	7.4	1.1	6.9	16.7	8.2	8.0	6.7	25.0	8.0	IV-XI
		ME	29.6	13.6	22.4	25.0	26.5	21.3	28.9	10.0	22.0	.05
		C-VOE	63.0	85.2	70.7	58.3	65.3	70.7	64.4	65.0	69.8	
		B. Action										
		I	0	0	0	2.1	2.0	0	0	5.0	.7	
		A	79.6	92.0	82.8	72.9	83.7	84.0	89.6	90.0	84.4	
		N	16.7	8.0	17.2	20.8	12.3	16.0	11.1	5.0	13.8	
		D	3.7	0	0	4.2	2.0	0	0	0	1.1	

APPENDIX B (Continued)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
Number			54	88	58	48	49	74	45	20	436	
15	11	The percentage of persons in the labor force employed in supervisory, managerial, and professional positions is increasing.										
		A. Relevance										IV-VI NS
		N-LE	13.0	4.5	13.8	10.4	6.1	4.0	11.1	10.0	8.5	IV-XI
		ME	16.7	28.4	20.7	16.7	22.4	17.6	31.1	10.0	21.6	NS
		C-VOE	70.3	67.1	65.5	72.9	71.5	78.4	57.8	80.0	69.9	
		B. Action										
		I	3.7	1.2	1.7	0	2.0	1.4	2.2	5.3	1.8	
		A	46.3	25.6	32.8	33.3	20.4	36.5	37.8	31.6	32.8	
		N	50.0	72.1	65.5	62.5	71.5	62.1	57.8	57.9	63.6	
		D	0	1.1	0	4.2	6.1	0	2.2	5.2	1.8	

APPENDIX B (Continued)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
	Number		54	87	58	48	49	75	45	19	435	
16	32	Persons over 45 years of age are experiencing increasing difficulty in obtaining employment.										IV-VI NS
		A. Relevance										
		N-LE	11.1	5.7	8.6	20.8	10.2	10.7	15.6	0	10.6	IV-XI NS
		ME	22.2	11.5	22.4	25.0	26.5	20.0	26.7	10.5	20.4	
		C-VGE	66.7	82.8	69.0	54.2	63.3	69.3	57.7	89.5	69.0	
		B. Action										
		I	50.0	58.1	51.7	60.4	67.3	76.0	66.7	84.2	62.7	
		A	13.0	18.6	20.7	6.2	8.2	4.0	13.3	5.3	12.0	
		N	35.1	23.1	25.6	27.2	24.5	18.7	15.6	10.5	23.5	
		D	1.9	1.2	0	6.2	0	1.3	4.4	0	1.8	

APPENDIX B (Continued)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
	Number		54	88	58	48	49	75	45	13	435	
17	55	Rapid social, economic, and technological changes in American society are engendering increased uncertainty in personal values and social direction.										IV-VI .01
		A. Relevance										
		N-LE	13.0	5.7	18.1	25.0	16.2	12.0	15.6	16.7	14.2	IV-XI .05
		ME	29.6	12.5	27.6	25.0	26.3	16.0	35.6	16.7	22.8	
		C-VGE	57.4	81.8	53.4	50.0	56.6	72.0	48.9	66.7	63.0	
		B. Action										
		I	55.5	14.2	46.6	43.7	58.6	47.9	57.8	55.6	50.1	
		A	14.8	17.4	15.5	4.2	6.1	6.8	4.4	0	10.2	
		N	27.8	36.1	34.5	29.6	32.6	38.5	35.6	27.7	34.8	
		D	1.9	2.3	3.4	12.5	2.0	6.8	2.2	16.7	4.9	

APPENDIX B (Continued)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
Number			54	86	58	48	49	74	45	20	434	
18	19	The agricultural and industrial productivity of the nation gradually is being concentrated into a relatively small number of units of production.										IV-VI NS
	A. Relevance											
		N-LE	3.7	10.5	13.8	22.9	14.3	2.7	17.8	20	12	IV-XI .05
		ME	18.5	20.9	25.9	22.9	24.5	25.7	37.8	5	23.7	
		C-VGE	77.8	68.6	60.3	54.2	61.2	71.6	44.4	75	64.3	
	B. Action											
		I	22.2	26.7	22.4	20.8	38.8	38.4	24.4	40	28.6	
		A	24.1	15.1	17.2	6.2	2	5.5	8.9	5	11.3	
		N	50.0	53.5	58.6	60.5	53.1	54.8	62.3	40.0	55.0	
		D	3.7	4.7	1.8	12.5	6.1	1.3	4.4	15.0	5.1	

APPENDIX B (Continued)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
Number			53	88	58	48	49	75	45	19	435	
19	53	Specialized training and employment opportunities for handicapped persons are increasing.										IV-VI NS
	A. Relevance											
		N-LE	13.2	5.7	5.2	16.7	10.2	8.0	8.9	10.5	9.2	IV-XI NS
		ME	22.6	14.8	19.0	35.4	26.5	28.0	42.2	42.1	26.1	
		C-VGE	64.2	79.5	75.9	42.9	63.3	64.0	48.9	47.4	64.3	
	B. Action											
		I	1.9	0	1.7	0	2	0	0	0	.7	
		A	88.7	92.0	86.2	87.5	90.8	87.8	95.6	94.7	90.1	
		N	9.4	6.9	12.1	8.3	6.1	9.5	4.4	5.3	8.1	
		D	0	1.1	0	4.2	0	2.7	0	0	1.1	

APPENDIX B (Continued)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
Number			54	88	58	48	49	74	45	19	435	
20	7	The ratio of the number of persons employed by corporations, institutions, and other persons to the number of self-employed persons is increasing.										
		A. Relevance										IV-VI NS
		N-LE	9.3	13.6	8.6	14.6	4.1	5.4	17.8	10.5	10.3	IV-XI
		ME	16.7	17	25.9	29.2	22.4	29.7	22.2	15.8	22.8	NS
		C-VGE	74	69.4	65.5	56.2	73.5	64.9	60.0	73.7	66.9	
		B. Action										
		I	18.5	27.3	12.1	8.3	22.4	11.0	15.5	5.2	16.6	
		A	16.7	9.1	15.5	14.6	24.1	4.1	6.7	0	9.4	
		N	62.9	62.5	69.0	66.7	69.4	78.1	71.1	89.5	69.4	
		D	1.9	1.1	3.4	10.4	4.1	6.8	6.7	5.3	4.6	

APPENDIX B (Continued)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
Number			54	88	58	48	49	75	45	20	437	
21	33	The number and percentage of women, especially married women, in the total labor force is increasing.										
		A. Relevance										IV-VI .001
		N-LE	11.1	1.1	3.4	18.8	4.1	13.3	20.0	5.0	9.2	IV-XI
		ME	34.3	12.5	31.1	33.3	22.4	24.0	48.9	25.0	27.2	.001
		C-VGE	55.5	86.4	65.5	47.9	73.5	62.7	31.1	70.0	63.6	
		B. Action										
		I	22.2	6.8	13.8	16.7	10.2	14.7	8.9	10.0	12.8	
		A	14.8	29.6	25.9	16.7	12.2	26.7	8.9	10.0	20.4	
		N	57.4	61.3	56.9	56.2	75.5	58.6	77.8	75.0	63.2	
		D	5.6	2.3	3.4	10.4	2.1	0	4.4	5.0	3.6	

APPENDIX B (Continued)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
Number			54	87	58	48	48	75	45	19	434	
22	22	The incidence of diseases and disorders of a psychological or emotional origin is increasing and is receiving more attention as a major health problem in America.										
		A. Relevance										IV-VI NS
		N-LE	20.4	6.9	17.2	37.5	10.4	12	17.8	10.5	15.9	IV-XI .001
		ME	25.9	9.2	20.7	18.7	18.7	14.7	35.6	26.3	19.4	
		C-VGE	53.7	83.9	62.1	43.8	70.9	73.3	46.6	63.2	64.7	
		B. Action										
		I	9.3	23.3	17.2	27.1	27.1	18.9	22.2	36.8	21.3	
		A	59.3	61.6	53.4	25	52.1	58.1	53.3	57.9	53.5	
		N	31.4	12.8	29.4	29.2	8.3	17.6	22.2	0	19.9	
		D	0	2.3	0	18.7	12.5	5.4	2.3	5.3	5.3	

APPENDIX B (Continued)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
Number			54	88	58	48	49	74	45	20	436	
23	42	The management of agricultural and industrial productivity is being shifted gradually from owners to managerial persons.										
		A. Relevance										IV-VI NS
		N-LE	9.2	6.8	10.3	27.1	14.3	13.5	15.6	15.0	13.1	IV-XI NS
		ME	33.3	15.9	27.6	22.9	24.5	16.2	28.9	20.0	22.9	
		C-VGE	57.4	77.3	62.1	50.0	61.2	10.3	55.6	65.0	64.0	
		B. Action										
		I	18.5	24.4	13.8	14.6	14.6	16.2	4.4	5.0	15.7	
		A	22.2	22.1	17.2	14.6	2.1	13.5	13.3	10.0	15.5	
		N	55.6	53.5	67.3	62.5	77.1	68.9	77.9	75.0	65.2	
		D	3.7	0	1.7	8.3	6.2	1.4	4.4	10.0	3.6	

APPENDIX B (Continued)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
Number			54	88	58	48	49	75	45	20	437	
24	18	Expenditures for and participation in leisure time and recreational activities are increasing.										
		A. Relevance										IV-VI .05
		N-LE	11.1	6.8	13.8	22.9	14.3	4.0	24.4	15.0	12.6	IV-XI .001
		ME	37.0	15.9	32.8	20.8	18.4	25.3	35.6	20.0	25.4	
		C-VGE	51.9	77.3	53.4	56.3	67.3	70.7	40.0	65.0	62.0	
		B. Action										
		I	1.9	0	0	2.1	4.1	1.3	4.4	0	1.6	
		A	46.3	42.0	36.2	29.2	51.0	53.3	17.8	60.0	41.6	
		N	48.1	55.7	59.5	56.2	42.8	45.4	75.5	35.0	53.4	
		D	3.7	2.3	3.3	12.5	2.1	0	2.3	5.0	3.4	

APPENDIX B (Continued)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
Number			54	88	58	48	49	75	45	19	436	
25	21	Management is becoming increasingly concerned about the physical, mental, and emotional welfare, physical comfort and safety of the employee.										
		A. Relevance										IV-VI NS
		N-LE	16.7	5.7	8.6	39.6	18.4	6.7	26.7	26.3	15.8	IV-XI .001
		ME	20.3	14.8	17.2	33.3	24.5	30.7	26.7	21.1	23.2	
		C-VGE	63	79.5	74.2	27.1	57.1	62.6	46.6	52.6	61	
		B. Action										
		I	1.9	0	0	3	2.1	0	0	0	.5	
		A	68.5	90.9	79.3	50	71.4	80	60	47.4	72.9	
		N	27.7	9.1	20.7	33.3	22.4	18.7	31.1	21.0	21.6	
		D	1.9	0	0	16.7	4.1	1.3	8.9	31.6	5.0	

APPENDIX B (Continued)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
Number			54	88	58	48	49	75	45	20	437	
26	25	The schools are performing and accepting major responsibilities for an increasing number of functions which formerly were vested with the home, church, and other agencies.										IV-VI NS
	A. Relevance											
		N-LE	16.7	3.4	15.5	27.1	18.4	12.0	28.9	20.0	15.8	IV-XI NS
		ME	24.1	18.2	36.2	22.9	28.6	22.7	28.9	25.0	25.2	
		C-VGE	59.2	78.4	48.3	50.0	53.0	65.3	42.2	55.0	59.0	
	B. Action											
		I	29.6	27.3	25.0	47.9	27.1	41.3	51.1	10.0	33.6	
		A	27.8	19.3	25.0	25.0	27.1	13.3	11.1	40.0	21.6	
		N	40.7	51.1	46.4	20.9	43.7	38.7	37.8	40.0	41.1	
		D	1.9	2.3	3.6	6.2	2.1	6.7	0	10.0	3.7	

APPENDIX B (Continued)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
Number			54	88	57	48	49	75	45	17	435	
27	51	The American people are becoming increasingly conscious of problems and practices pertaining to health and safety.										IV-VI .01
	A. Relevance											
		N-LE	11.1	1.1	17.5	31.2	20.4	13.3	24.4	10.5	14.9	IV-XI .001
		ME	18.5	14.8	26.3	31.2	30.6	37.3	35.6	42.1	27.5	
		C-VGE	70.4	84.1	56.1	37.5	49.0	49.3	40.0	47.4	57.2	
	B. Action											
		I	0	0	0	0	2	1.3	0	0	.4	
		A	85.1	93.2	82.4	68.7	81.6	85.3	80.0	94.7	83.8	
		N	13.0	6.8	17.6	23.0	8.3	9.4	20.0	0	12.4	
		D	1.9	0	0	8.3	8.1	4.0	0	5.3	3.0	

APPENDIX B (Continued)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
Number			54	88	58	48	49	74	45	19	435	
28	12	The number of occupations for which licenses or certificates are required is increasing.										
	A. Relevance											IV-VI NS
		N-LE	13	6.8	15.5	27.1	6.1	5.4	22	10.5	12.4	IV-XI
		ME	25.9	29.6	25.9	33.3	28.6	37.8	38	21.1	30.8	.05
		C-VGE	61.1	63.6	58.6	39.6	65.3	56.8	40	68.4	56.8	
	B. Action											
		I	1.9	3.4	0	6.2	2	5.5	6.7	10.5	3.9	
		A	35.2	47.1	41.3	10.4	36.7	37	31.1	31.6	35.6	
		N	62.9	48.3	55.2	81.3	55.2	54.8	55.5	52.6	57.5	
		D	0	1.2	3.5	2.1	6.1	2.7	6.7	5.3	3.0	

APPENDIX B (Continued)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
Number			54	88	58	48	49	75	45	19	436	
29	6	Differences in social and economic characteristics of rural and urban groups are diminishing.										
	A. Relevance											IV-VI .05
		N-LE	13.0	4.5	19.0	31.3	12.3	10.7	22.2	26.3	15.2	IV-XI
		ME	25.9	18.2	24.1	35.4	16.3	29.3	37.8	26.3	25.9	.001
		C-VGE	61.1	77.3	56.9	33.3	71.4	60.0	40.0	47.4	58.9	
	B. Action											
		I	1.8	1.1	0	0	4.1	1.3	0	0	1.1	
		A	50	53.4	39.7	39.6	36.7	48	22.2	36.9	42.9	
		N	48.2	44.3	60.3	45.8	53.1	49.4	64.5	52.6	51.4	
		D	0	1.2	0	14.6	6.1	1.3	13.3	10.5	4.6	

APPENDIX B (Continued)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
Number			54	88	58	48	49	74	45	19	435	
30	54	Individuals are becoming increasingly more dependent on secondary (second-hand) media of communication as sources for interpretation of information.										
		A. Relevance										IV-VI .001
		N-LE	20.4	3.4	24.1	27.1	22.2	16.2	22.2	21.1	17.9	IV-XI .05
		ME	28.8	18.2	29.3	25.0	20.2	18.9	31.1	15.8	23.2	
		C-VGE	51.8	78.4	46.6	47.9	56.6	64.9	46.7	63.2	58.6	
		B. Action										
		I	44.4	33.0	44.8	43.7	50.0	50.0	57.8	57.9	45.6	
		A	16.7	22.7	17.2	8.3	2.1	8.3	4.4	15.8	12.7	
		N	38.9	43.2	34.6	31.3	37.5	32.0	28.9	15.8	35.0	
		D	0	1.1	3.4	16.7	10.4	9.7	8.9	10.5	6.7	

APPENDIX B (Continued)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
Number			54	88	57	48	49	75	45	20	436	
31	31	The American people are becoming increasingly security conscious and are participating more extensively in plans for pensions, health and life insurance, and social welfare programs provided by industry and government.										
		A. Relevance										IV-VI .05
		N-LE	20.4	7.9	21.0	35.4	13.4	12.0	26.7	25.0	18.8	IV-XI NS
		ME	25.9	18.2	24.6	25.0	26.5	26.7	31.1	15.0	24.3	
		C-VGE	53.7	73.9	54.4	39.6	55.1	61.3	42.2	60.0	56.9	
		B. Action										
		I	9.3	2.3	0	6.3	8.2	6.7	20.0	0	6.4	
		A	29.6	56.8	35.1	27.1	36.7	54.7	13.3	75.0	41.0	
		N	55.5	35.2	57.9	52.0	49.0	36.0	53.4	15.0	45.3	
		D	5.6	5.7	7.0	14.6	6.1	2.6	13.3	10.0	7.3	

APPENDIX B (Continued)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
Number			54	88	58	48	48	75	45	19	435	
32	50	The range and scope of family activities and occupational opportunities (due in part to increased units of private transportation) are expanding.										
		A. Relevance										IV-VI .01
		N-LE	11.1	4.5	12.1	29.2	18.7	17.3	20.0	21.0	15.1	IV-XI .001
		ME	27.8	12.5	36.2	39.6	31.2	34.7	48.9	26.3	30.7	
		C-VGE	61.1	83.0	51.7	31.2	50.0	48.0	31.1	52.6	53.8	
		B. Action										
		I	1.8	1.1	0	0	2.1	0	0	0	.7	
		A	40.7	40.9	36.8	50.0	37.5	45.3	35.6	47.4	41.5	
		N	53.8	58.0	59.7	39.6	54.2	52.0	57.7	42.1	53.4	
		D	3.7	0	3.5	10.4	6.2	2.7	6.7	10.5	4.4	

APPENDIX B (Continued)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
Number			54	88	58	48	49	75	45	20	437	
33	39	Geographical mobility is increasing for highly educated workers.										
		A. Relevance										IV-VI NS
		N-LE	18.5	6.8	12.1	29.2	22.4	14.7	33.3	15.0	17.6	IV-XI .001
		ME	27.8	21.6	27.5	39.6	18.4	37.3	35.6	40.0	29.7	
		C-VGE	53.7	71.6	60.3	31.2	59.2	48.0	31.1	45.0	52.6	
		B. Action										
		I	1.8	1.1	0	0	2	0	0	5.0	.9	
		A	20.4	29.5	43.1	39.6	8.2	30.7	31.1	40.0	29.7	
		N	68.5	67.1	51.7	47.9	77.6	65.3	60.0	35.0	61.8	
		D	9.3	2.3	5.2	6.2	12.2	4.0	8.9	20.0	7.6	

APPENDIX B (Continued)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
Number			54	88	57	48	49	74	45	18	433	
34	5	America is moving progressively toward a homogeneous "middle class" society.										
	A. Relevance											IV-VI .01
		N-LE	18.5	45.5	24.6	22.9	18.3	12.2	20	44.4	17.1	IV-XI .001
		ME	40.7	26.1	33.3	43.7	34.7	24.3	28.9	11.2	31.2	
		C-VGE	40.8	69.4	42.1	33.4	47.0	63.5	51.1	44.4	51.7	
	B. Action											
		I	1.8	33.4	7	14.6	8.2	17.6	8.9	5.5	8.6	
		A	29.6	28.7	22.8	25	20.4	31.1	22.2	33.3	26.6	
		N	68.6	65.5	63.2	43.7	63.3	48.6	60.0	44.5	58.6	
		D	0	2.4	7.0	16.7	8.1	2.7	8.9	16.7	6.2	

APPENDIX B (Continued)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
Number			54	88	58	48	49	75	45	20	437	
35	38	The percentage of the labor force in farming is declining.										
	A. Relevance											IV-VI NS
		N-LE	14.8	9.1	10.3	64.6	22.4	18.7	40.0	30.0	20.1	IV-XI .001
		ME	18.5	17.0	32.8	31.2	30.6	33.3	31.1	40.0	27.7	
		C-VGE	66.0	73.9	56.9	33.3	46.9	48.0	28.9	30.0	52.2	
	B. Action											
		I	3.7	20.4	6.9	2.1	2.1	5.4	2.2	10.0	7.6	
		A	20.4	8.0	17.2	31.2	16.7	10.8	6.7	0	14.2	
		N	68.5	65.9	75.9	54.2	68.7	77.0	80.0	70.0	70.1	
		D	7.4	5.7	0	12.5	12.5	6.8	11.1	20.0	8.1	

APPENDIX B (Continued)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
Number			53	88	58	48	49	75	45	20	436	
36	30	The percentage of persons in the labor force who are employed on a second job, either part-time or full-time, is increasing.										
-												IV-VI NS
	A. Relevance											
		N-LE	1.7	4.5	13.8	31.2	14.3	13.3	35.6	20.0	16.7	IV-XI
		ME	26.4	25.0	34.5	39.6	32.6	38.7	35.6	10.0	31.6	.001
		C-VGE	56.6	70.5	51.7	29.2	53.1	48.0	28.8	70.0	51.6	
	B. Action											
		I	20.7	27.3	32.7	25.0	25.0	44.6	46.7	80.0	34.1	
		A	18.9	20.4	12.1	4.2	16.7	27.0	0	0	10.8	
		N	54.7	48.9	46.6	56.2	45.8	50.0	31.1	15.0	46.6	
		D	5.7	3.4	8.6	14.6	12.5	2.7	22.2	5.0	8.5	

APPENDIX B (Continued)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
Number			54	88	58	48	49	74	45	20	436	
37	9	The percentage of persons in the labor force who are members of organized labor unions is increasing.										
												IV-VI NS
	A. Relevance											
		N-LE	27.8	18.2	13.8	27.1	20.4	9.5	24.4	10.0	18.8	IV-XI
		ME	20.4	23.8	32.3	33.3	24.5	23.0	48.9	25.0	28.2	.01
		C-VGE	51.8	58.0	53.4	39.6	55.1	67.5	26.7	65.0	53.0	
	B. Action											
		I	9.3	20.9	5.2	2.1	2.0	0	8.9	0	7.4	
		A	9.3	9.3	13.8	12.5	20.4	33.8	2.2	85	18.4	
		N	75.9	60.5	79.3	62.5	65.3	63.5	75.6	10	65.4	
		D	5.5	9.3	1.7	22.9	12.3	2.7	13.3	5	8.8	

APPENDIX B (Continued)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
Number			54	88	58	48	49	75	44	19	435	
38	28	The percentage of youth who serve in military service prior to entering the labor force is increasing.										
	A. Relevance											IV-VI .01
		N-LE	24.1	9.1	13.8	29.2	24.5	21.3	20.5	21	19.3	IV-XI .01
		ME	31.5	18.2	36.2	31.2	30.6	41.3	38.6	5.3	31.0	
		C-VGE	44.4	72.7	50.0	39.6	44.9	37.3	40.9	63.2	49.6	
	B. Action											
		I	1.9	6.8	0	8.3	18.7	13.3	2.3	26.3	8.3	
		A	13.0	20.5	8.6	6.2	8.4	6.7	20.5	10.5	12.2	
		N	75.9	69.3	82.8	75.3	66.7	70.7	65.8	47.4	71.2	
		D	9.2	3.4	8.6	10.2	6.2	9.3	11.4	15.8	8.3	

APPENDIX B (Continued)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
Number			54	88	58	48	49	75	45	20	437	
39	44	Interest in and acceptance of improved dietary practices and higher levels of nutrition (e.g., high protein diet, vitamins, calorie content) are increasing.										
	A. Relevance											IV-VI .001
		N-LE	14.8	3.4	12.4	37.5	26.5	22.7	31.1	30.0	21.0	IV-XI .001
		ME	25.9	12.5	27.6	33.3	32.6	34.7	44.4	35.0	28.8	
		C-VGE	59.2	84.1	50.0	29.2	40.8	42.7	24.4	35.0	50.1	
	B. Action											
		I	0	0	0	0	8.2	0	0	0	.9	
		A	85.2	93.2	63.8	64.6	75.5	80.0	71.1	75.0	77.8	
		N	12.9	5.7	31.0	18.7	6.1	16.0	22.2	5.0	14.9	
		D	1.9	1.1	5.2	16.7	10.2	4.0	6.7	20.0	6.4	

APPENDIX B (Continued)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
Number			54	88	58	48	49	75	45	20	436	
40	48	The social and economic life of the nation is becoming more centralized, standardized, and organized into formal patterns.										IV-VI .01
		A. Relevance										
		N-LE	25.9	10.2	22.4	37.5	14.6	14.7	26.7	20.0	20.2	IV-XI .01
		ME	29.6	25.0	39.6	31.2	35.4	22.7	22.2	40.0	29.4	
		C-VGE	44.4	64.8	37.9	31.2	50.0	62.7	51.1	40.0	50.4	
		B. Action										
		I	31.5	45.4	45.6	43.7	42.6	52.0	53.3	60.0	39.3	
		A	9.2	13.6	10.5	4.2	42.0	5.5	22.0	0	6.0	
		N	55.6	39.8	38.6	35.4	48.9	39.8	42.2	25.0	49.2	
		D	3.7	1.2	5.3	16.7	4.2	2.7	2.2	15.0	5.5	

APPENDIX B (Continued)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
Number			54	88	58	48	49	75	45	20	437	
41	1	Purchasing habits of the American people are changing with the use of credit buying and long-term payments increasing.										IV-VI .001
		A. Relevance										
		N-LE	11.2	11.4	27.6	33.3	28.6	17.4	26.7	30.0	19.2	IV-XI .001
		ME	44.4	45.4	37.9	37.5	38.8	29.3	28.9	20.0	28.8	
		C-VGE	44.4	43.2	34.5	29.2	32.6	55.3	44.4	50.0	52.0	
		B. Action										
		I	16.7	25.0	6.9	12.5	26.5	24.0	17.8	30.0	19.7	
		A	20.3	25.0	10.3	2.1	2.0	6.7	2.2	15.0	11.4	
		N	61.1	48.9	75.9	68.7	61.3	62.6	71.1	40.0	61.8	
		D	1.9	1.1	6.9	16.7	10.2	6.7	8.9	15.0	7.1	

APPENDIX B (Continued)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
Number			54	88	58	48	49	75	44	19	435	
42	20	The percentage of the population classified as "rural-non-farm" is increasing.										
	A. Relevance											IV-VI NS
		N-LE	5.6	.8	15.5	45.8	28.6	17.3	38.6	36.8	21.2	IV-XI
		ME	22.2	23.9	25.9	25	32.7	38.7	27.3	15.8	27.5	.001
		C-VGE	72.2	68.1	58.6	29.2	38.7	44	34.1	47.4	51.3	
	B. Action											
		I	23.7	11.5	1.7	.0	.0	.0	2.3	0	3.2	
		A	18.5	13.8	20.7	12.5	6.1	14.7	9.1	10	13.8	
		N	75.9	72.4	74.2	77.1	79.6	74.6	63.6	65.0	74.0	
		D	1.9	2.3	3.4	10.4	14.3	10.7	25.0	15.0	9.0	

APPENDIX B (Continued)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
Number			54	87	58	48	49	75	45	20	436	
43.5	16	The percentage of the total national income received by agriculture is declining.										
	A. Relevance											IV-VI NS
		N-LE	22.2	6.9	17.2	33.3	32.7	18.7	31.1	35.0	21.8	IV-XI
		ME	25.9	23.0	27.6	41.7	36.5	38.7	42.2	20.0	31.0	.001
		C-VGE	51.9	70.1	55.2	25.0	40.8	42.6	26.7	45.0	47.2	
	B. Action											
		I	24.0	29.1	6.9	2.1	16.3	12.2	11.1	25.0	16.1	
		A	13.0	17.4	15.5	10.4	6.1	10.8	6.7	10.0	12.0	
		N	63.0	51.2	70.8	72.9	71.5	71.6	68.9	45.0	65.0	
		D	0	2.3	6.8	14.6	6.1	5.4	13.3	20.0	6.9	

APPENDIX B (Continued)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
Number			54	88	58	48	49	75	45	19	436	
43.5	49	The ratio of disposable income to total income is declining, with taxes taking a higher percentage of total income.										
	A. Relevance											IV-VI .05
		N-LE	18.5	6.8	17.2	54.2	34.7	26.7	20.0	31.6	23.8	IV-XI .001
		ME	31.5	19.3	32.8	20.8	34.7	22.7	31.1	15.8	26.1	
		C-VGE	50.0	73.9	50.0	25.0	30.6	50.7	49.0	52.6	50.0	
	B. Action											
		I	31.5	45.4	45.6	25.0	25.0	22.7	57.8	15.8	35.2	
		A	9.2	13.6	10.5	6.2	10.4	8.0	4.4	10.5	9.4	
		N	55.6	39.8	38.6	43.8	56.3	65.3	31.1	42.1	47.6	
		D	3.7	1.2	5.3	25.0	8.3	4.0	6.7	31.6	7.8	

APPENDIX B (Continued)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
Number			54	88	57	48	49	75	45	19	435	
45	41	The utilization of synthetic products, low-grade materials, and by-products is increasing.										
	A. Relevance											IV-VI .05
		N-LE	24.1	6.8	12.5	45.8	26.5	22.7	20.0	36.8	22.3	IV-XI .001
		ME	24.1	23.9	35.1	35.4	34.7	29.3	33.3	31.6	30.1	
		C-VGE	51.8	69.3	47.4	18.7	38.8	48.0	46.7	31.6	47.6	
	B. Action											
		I	14.8	12.8	14.0	4.2	10.2	5.4	4.4	10.5	9.7	
		A	27.8	34.9	29.8	22.9	28.6	35.1	40.0	26.3	31.5	
		N	50.0	47.7	49.2	54.2	51.0	51.4	37.8	36.9	48.4	
		D	7.4	4.6	7.0	18.7	10.2	8.1	17.8	26.3	10.4	

APPENDIX B (Continued)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
Number			54	88	58	48	48	75	45	19	435	
46	40	Interest patterns of family members are becoming increasingly varied and oriented toward groups and activities outside the home.										IV-VI .001
	A. Relevance											
		N-LE	18.5	4.5	31.0	39.6	20.8	16.0	33.3	36.8	21.8	IV-XI .001
		ME	35.2	15.9	27.6	33.3	35.4	42.7	31.1	26.3	30.6	
		C-VGE	46.3	79.5	41.4	27.1	43.7	41.3	35.6	36.8	47.6	
	B. Action											
		I	29.6	43.0	15.5	16.7	18.7	20.0	26.7	15.0	25.1	
		A	18.5	17.4	19.0	10.4	4.2	13.3	6.6	15.0	13.6	
		N	46.3	38.5	58.6	52.1	70.9	58.7	57.8	35.0	52.5	
		D	5.6	1.1	6.9	20.8	6.2	8.0	8.9	35.0	8.8	

APPENDIX B (Continued)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
Number			54	88	58	48	49	75	45	20	437	
47	10	The percentage of the population dependent upon incomes from pensions, annuities, and Social Security is increasing.										IV-VI .001
	A. Relevance											
		N-LE	27.8	6.8	27.6	41.7	24.5	17.3	31.1	25.0	23.1	IV-XI .001
		ME	31.5	22.7	31.0	35.4	30.6	34.7	33.3	15.0	30.0	
		C-VGE	40.7	70.5	41.4	22.9	44.9	48.0	35.6	60.0	46.9	
	B. Action											
		I	5.6	6.9	1.7	2.1	8.2	8.0	6.7	0	5.5	
		A	22.2	24.1	13.8	8.3	8.2	21.3	0	31.6	16.3	
		N	66.6	66.7	77.6	58.4	67.3	65.4	66.6	47.4	66.2	
		D	5.6	2.3	6.9	31.2	16.3	5.3	26.7	21.0	12.0	

APPENDIX B (Continued)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
Number			54	87	58	48	49	74	45	20	435	
48	35	The number of persons over 65, who are not gainfully employed, is increasing.										
	A. Relevance											IV-VI .05
		N-LE	27.8	16.1	24.1	54.2	18.4	21.6	44.4	35.0	27.8	IV-XI .001
		ME	29.6	17.2	29.3	14.6	22.4	31.1	31.1	10.0	24.1	
		C-VGE	42.6	66.7	46.6	31.2	59.2	47.3	24.4	55.0	48.1	
	B. Action											
		I	18.5	34.5	15.5	16.7	38.8	41.1	28.9	30.0	28.8	
		A	11.1	19.5	15.5	8.3	10.2	5.5	6.7	15.0	11.8	
		N	64.8	42.6	63.8	43.8	44.9	49.3	46.6	40.0	50.0	
		D	5.6	3.4	5.2	31.2	6.1	4.1	17.8	15.0	9.4	

APPENDIX B (Continued)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
Number			54	87	58	48	49	74	45	19	434	
49	37	The political life of the nation is becoming more centralized and organized into formal bureaucratic patterns.										
	A. Relevance											IV-VI NS
		N-LE	24.1	17.2	25.9	43.7	24.5	21.6	28.9	47.4	26.3	IV-XI NS
		ME	33.3	30.0	31.0	27.1	24.5	27.0	26.7	21.0	28.3	
		C-VGE	42.6	52.9	43.1	29.2	51.0	56.4	44.4	31.6	45.4	
	B. Action											
		I	57.4	50.0	43.1	27.1	35.4	39.2	64.4	36.8	44.9	
		A	7.4	9.3	5.2	8.3	14.6	6.8	0	5.3	7.4	
		N	25.9	32.6	43.1	27.1	47.9	48.6	24.5	26.3	35.9	
		D	9.3	8.1	8.6	37.5	2.1	5.4	11.1	31.6	11.8	

APPENDIX B (Continued)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
Number			54	87	57	48	48	75	45	18	432	
50	36	Sources of value patterns of American people are changing from foundations in eternal value to foundations in social usage.										
		A. Relevance										IV-VI .001
		N-LE	33.3	10.3	33.3	52.1	27.1	16.0	28.9	55.5	27.5	IV-XI .001
		ME	29.6	20.7	35.1	18.7	29.2	18.7	37.8	27.8	26.2	
		C-VGE	37.0	69.0	31.6	29.2	43.7	65.3	33.3	16.7	46.3	
		B. Action										
		I	33.3	40.7	28.1	37.5	21.3	17.6	40.0	22.2	30.8	
		A	9.3	25.6	14.0	10.4	12.8	43.2	13.3	16.7	20.3	
		N	48.1	32.5	42.1	27.1	57.4	35.2	24.5	27.8	37.3	
		D	9.3	1.2	15.8	25.0	8.5	4.0	22.2	33.3	11.6	

APPENDIX B (Continued)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
Number			54	88	58	48	49	74	45	20	436	
51	15	The proportion of land used for purposes other than farming (e.g., transportation, industry, and recreation) is increasing.										
		A. Relevance										IV-VI .01
		N-LE	16.7	8.0	17.2	54.2	28.6	24.4	46.7	35.0	25.7	IV-XI .001
		ME	8.5	20.5	39.7	25.0	30.5	37.8	33.3	25.0	28.9	
		C-VGE	64.8	71.5	43.1	28.0	40.8	37.8	20.0	40.0	45.4	
		B. Action										
		I	16.7	12.6	1.7	0	4.1	2.7	0	0	5.7	
		A	13.0	14.9	27.0	8.3	4.1	12.2	6.7	20.0	12.4	
		N	68.4	71.3	72.4	58.4	65.3	79.7	68.9	65.0	69.9	
		D	1.9	1.2	5.2	33.3	26.5	5.4	24.4	15.0	12.0	

APPENDIX B (Continued)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
Number			54	88	58	48	48	74	45	20	435	
52	47	Secondary groups (e.g., lodges, clubs, and unions) are becoming increasingly important to individuals, and are claiming a larger share of individual time, energies, and loyalties.										
	A. Relevance											IV-VI .001
		N-LE	24.1	11.4	32.8	56.2	39.6	31.1	48.9	25.0	31.7	IV-XI
		ME	42.6	23.9	44.8	29.2	33.3	36.5	26.7	30.0	33.3	
		C-VGE	33.3	64.8	22.4	14.6	27.1	32.4	24.4	45.0	34.9	.001
	B. Action											
		I	16.7	26.4	0	18.7	16.7	10.8	17.8	0	15.0	
		A	11.1	10.3	14.0	4.2	6.2	6.8	4.4	30.0	9.5	
		N	59.2	57.5	73.7	41.2	70.9	70.2	57.8	50.0	61.4	
		D	13.0	5.8	12.3	35.4	6.2	12.2	20.0	20.0	14.1	

APPENDIX B (Continued)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
Number			54	87	58	47	47	74	45	19	431	
53	27	The percentage of the total income received by the middle 80 per cent of income recipients is increasing slightly.										
	A. Relevance											IV-VI .001
		N-LE	35.2	16.1	24.1	48.9	34.0	24.4	42.2	42.1	30.3	IV-XI
		ME	38.9	29.9	53.4	38.3	29.8	37.8	40.0	36.8	37.8	.001
		C-VGE	25.9	54.0	22.4	12.8	36.2	37.8	17.8	21.0	31.8	
	B. Action											
		I	0	0	0	2.1	0	0	4.4	0	.7	
		A	35.2	44.8	25.9	14.9	31.9	36.5	8.9	31.6	30.6	
		N	51.8	50.6	62.0	49.0	55.3	52.7	68.9	42.1	54.5	
		D	13.0	4.6	12.1	34	12.8	10.8	17.8	26.3	14.2	

APPENDIX B (Continued)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
Number			54	88	58	48	48	75	45	20	436	
54	14	The center of population is shifting towards western and southwestern regions of the United States.										
	A. Relevance											IV-VI NS
		N-LE	37	25	24.1	62.5	39.6	45.3	48.9	55	39.4	IV-XI .001
		ME	20.4	35	34.5	20.8	27.1	36	28.9	15	29.1	
		C-VGE	42.6	40	41.4	16.7	33.3	18.7	22.2	30	31.5	
	B. Action											
		I	3.7	1.1	3.4	0	0	2.7	0	5	1.8	
		A	13	13.6	13.8	2.1	6.2	5.3	2.2	0	8.3	
		N	68.5	75.7	77.6	56.2	62.5	66.7	71.1	60.0	68.4	
		D	14.8	11.6	5.2	41.7	31.3	25.3	26.7	35.0	21.5	

APPENDIX B (Continued)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
Number			54	88	58	48	49	75	45	19	436	
55	2	The percentage of the total population claiming affiliation with a religious organization is increasing.										
	A. Relevance											IV-VI .05
		N-LE	64.8	45.4	60.3	75.0	61.3	58.7	48.9	89.5	59.4	IV-XI .05
		ME	11.2	30.7	25.9	12.5	22.4	18.7	33.3	0	21.6	
		C-VGE	24.0	23.9	13.8	12.5	16.3	22.6	17.8	10.5	19.0	
	B. Action											
		I	0	0	3.4	2.1	0	9.3	0	0	2.3	
		A	29.6	32.9	19.0	10.4	16.3	10.7	22.2	0	19.9	
		N	46.3	46.7	50.0	41.7	55.1	56.0	44.5	65.0	48.3	
		D	24.1	20.4	27.6	45.8	28.6	24.0	33.3	35.0	29.5	

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VOCATIONAL EDUCATION IN PUBLIC SCHOOLS AS RELATED TO SOCIAL, ECONOMIC, AND TECHNICAL TRENDS

PART II

THE APPRAISAL OF PROGRAMS OF VOCATIONAL AGRICULTURE AND INDUSTRIAL EDUCATION

Norbert J. Nelson

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THE DIVISION OF EDUCATION

Lafayette, Indiana

August, 1960

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This Report is the Second Report of the Project

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PREFACE AND ACKNOWLEDGEMENTS

The report presented herein is the second part of the project entitled "Vocational Education in Public Schools as Related to Social, Economic, and Technical Trends," completed in fulfillment of a contract between the United States of America and Purdue University. This part is directed toward (1) ascertaining the extent to which existing programs of vocational agriculture and industrial education in Indiana high schools are manifesting the conditions and trends analyzed in Part I of the project, and (2) identifying variables related to variations in the social adaptability of these programs. This report, essentially, is divided into three parts. The first three chapters are common to both programs. These chapters include the chapter on objectives and design (Chapter I), the chapter on the preparation of data-collecting instruments (Chapter II), and the chapter on the selection of samples (Chapter III). Chapters IV through IX pertain to the appraisal of programs of vocational agriculture, and Chapters X through XV pertain to the appraisal of programs of industrial education.

The first four chapters for each program actually are complete studies in themselves. Studies of purposes are reported in Chapters IV and X; studies of operations are reported in Chapters V and XI; analyses of the programs for social adaptability, and the identification of variables related thereto, are reported in Chapters VI and XII; and studios of resources are reported in Chapters VII and XIII. Analyses of the interrelationship among operations, purposes, and resources are presented in Chapters VIII and XIV. Chapter IX presents a synthesis of the analyses for vocational agriculture, and Chapter XV presents a similar synthesis for industrial education.

A host of persons have participated in or assisted with the study, and the cooperation of these persons is acknowledged with gratitude. For groups, thanks are due the members of the juries, the principals and teachers in the participating schools, the student assistants, and the secretaries of the Department of Education, Purdue University, who assisted with the project. Special acknowledgement is given Professors D.H. Cooper, Paul Alexander, H.S. Belman, E.E. Clanin, C.A. Pound, and Professor Emeritus B.C. Lawson, Division of Education, Purdue University, for administrative assistance; Professor J.A. Norton, Jr., and Research Assistants Bette Bain and Carol Shelley, Department of Mathematics and Statistics, Purdue University, for statistical assistance; Research Assistants W.K. Bugher, J.H. Grantham, and E.S. Wagner for assistance during the developmental and data-collecting phases of the study; and Graduate Assistants E.P. Christmas and R.K. Edwards for special assistance.

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CHAPTER I

THE DEFINITION AND ANALYSIS OF THE PROBLEM

The report presented herein is the second part of a study entitled "Vocational Education in Public Schools as Related to Social, Economic, and Technical Trends." The study was concerned with determining (1) the nature of vocational educational programs that should be offered in light of contemporary conditions and trends (Part I), and (2) the extent to which selected vocational programs in public schools are efficaciously serving members of society in an era of manifold and multifarious changes (Part II). The first part of the study, reported in a separate publication,[1] dealt with the identification of a list of fifty-five trends obtained from a search of literature in sociology, economics, education, technology, and related areas. The list of fifty-five trends was ranked by specialists in six fields -- economics, sociology, philosophy of education, vocational education, management, and labor -- in terms of the extent to which each trend should be considered in planning programs of vocational education. The results of the analyses of trends were used to develop a set of characteristics of vocational programs which manifest existing conditions and trends in society.

In the second part of the study, the characteristics of vocational programs as were determined from Part I of the study were used to construct a series of instruments which were used in appraising schools (1) to determine a quantitative measure of the extent to which a school is operating a program which manifests the previously identified conditions and trends, as compared with other schools, and (2) to identify variables which are related to variations in the extent to which schools are operating programs which manifest these conditions and trends. The instruments so constructed were used to appraise a sample of eighty-five schools offering vocational agriculture and/or industrial education programs in Indiana. The preparation of data-collecting instruments, the selection of samples, and the collection and analyses of data pertaining to the study of vocational agriculture and industrial education programs in the eighty-five school sample are presented in this report.

I. THE PROBLEM

The central problem of the second part of the study entitled "Vocational Education in Public Schools as Related to Social, Economic,

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[1] F.J. Woerdehoff, N. J. Nelson, and J. K. Coster, Vocational Education in Public Schools as Related to Social, Economic, and Technical Trends: Part I. The Analysis of Trends and Concepts (Studies in Education, No. 1, Lafayette, Indiana: Division of Education, Purdue University, 1960).

and Technical Trends" was to analyze vocational agriculture and industrial education programs in a selected sample of Indiana high schools in terms of the extent to which these programs were manifesting contemporary social, economic, and technical conditions and trends; and to identify variables which were related to and associated with variations in scores assigned to programs in schools. The scores were designed to yield a quantitative measure which reflected both the emphasis being exerted by a school to attain a specific purpose, and the relative importance of the purposes being attained.

II. BACKGROUND AND SIGNIFICANCE OF THE PROBLEM

In recent years, especially since the close of World War II, rapid and significant changes have taken place in American society which are likely to influence to a very great extent the development of programs designed to prepare persons for occupational proficiency. The impact of these changes in society has been especially significant for both agricultural education and industrial education. Changes in the science and technology of agriculture have brought about changes in human abilities needed for agriculture. Where once the acquisition of simple agrarian skills sufficed to assure a modicum of success in farming, today the person who expects to succeed in this occupation must develop a wide range of technical, managerial, and mechanical skills and abilities together with a broad understanding of the relationship of farming to the social, economic, and political world. The changing occupational structure in industry, with an actual decrease in the number of persons employed as unskilled laborers and a constant increase in the number and complexity of industrial positions, with attendant shifts in job opportunities and positions, suggest and give rise to a constant reshaping of programs in industrial education.

For many years the American public high school has accepted the objective of vocational proficiency in principle. Programs have been designed and implemented both to help persons select and prepare for occupations as well as to assist them in adjusting to changing occupational demands or to prepare for new occupational skills. Each year thousands of high school youths are enrolled in these programs in the public schools throughout the United States. Additional thousands of young adults and adults are enrolled in vocational programs designed to help them prepare for, become established in, and adjust to occupational demands brought about by changes in society. The efficacy of these programs is dependent on the extent to which vocational education has kept pace with the changing occupational and related requirements based on analyses of social, economic, and technical conditions and trends. Constant appraisal is needed, not only to verify efficiency of operation of vocational programs, but, more importantly, to ascertain whether programs actually are dynamic both

in manifesting, as well as anticipating and even redirecting, social change.

III. THE OBJECTIVES

The central problem of this study was concerned with (1) the nature of vocational programs that should be offered in light of contemporary conditions and trends, (2) the extent to which public schools included in a selected sample of Indiana high schools are operating programs of vocational agriculture and industrial education which manifest previously identified social, economic, and technical conditions and trends, and (3) the identification of variables related to socially adapted programs of vocational education in these two selected fields. The problem was sub-divided into twelve objectives.

1. To prepare a series of instruments to be used in appraising and collecting data pertaining to the purposes, operations, and resources for each of the two fields -- vocational agriculture and industrial education -- included in the study.

2. To select an adequate sample of schools offering programs of vocational agriculture and/or industrial education in Indiana public high schools.

3. To select juries of educational specialists to appraise the relative importance of purposes of vocational agriculture and industrial education, and to appraise the educational value of levels of operation for vocational agriculture and industrial education.

4. To determine the relative importance of each of a list of twenty-five purposes of vocational agriculture and of each of a list of twenty-three purposes of industrial education, as appraised in light of a list of social, economic, and technical trends which have been ranked in order of the extent to which the trends should be considered in planning future programs of vocational education.

5. To ascertain the extent of agreement between scores assigned to purpose items by schools, based on acceptance of purposes as goals in vocational agriculture or industrial education programs, and scores assigned to purposes by jury members based on judgments as to the relative importance of purposes.

6. To obtain a score indicative of the operational emphasis and effort being put forth to attain each purpose in each type of program for vocational agriculture teachers and industrial education teachers in the schools involved.

7. To ascertain which of a selected group of school and community variables are related to variations in scores assigned to

schools as a measure of the relative amount of operational effort and emphasis being put forth to attain a specific purpose.

8. To obtain for each teacher and for each school in the sample a quantitative measure of the operational effort and intensity put forth to attain all purposes identified for the two programs, modified in terms of the relative importance of a particular purpose.

9. To ascertain the relationship between operational effort and emphasis put forth to attain purposes, modified in terms of the relative importance of the purpose, and (1) selected school and community variables and (2) selected material and human resource variables.

10. To ascertain the relationship between human and material resources provided to operate programs of vocational education in agricultural education and industrial education and selected school and community variables.

11. To ascertain the inter-relationship among purposes, operations, and resources for programs of vocational agriculture and industrial education.

12. To analyze and synthesize findings to determine if possible direction and possible implications are suggested as meriting consideration in planning future programs of vocational agriculture or industrial education.[2]

IV. THE DESIGN OF THE STUDY

The theoretical construct underlying the design of Part II of the study has been elaborated in a publication entitled "A Bidimensional Approach to Educational Appraisal."[3] This theoretical construct was developed by the directors of the present project, and was applied

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[2] Each of the above objectives is treated in one or more succeeding chapters in this report. Objective 1 is treated in Chapter II. Objectives 2 and 3 are treated in Chapter III. Objectives 4 and 5 are treated in Chapters IV and X. Objectives 6 and 7 are treated in Chapters V and XI. Objectives 8 and 9 are treated in Chapters VI and XII. Objective 10 is treated in Chapters VII and XIII. Objective 11 is treated in Chapters VIII and XIV. Objective 12 is treated in Chapters XI, XV, and XVI.

[3] J.K. Coster, N.J. Nelson, and F.J. Woerdehoff, A Bidimensional Approach to Educational Appraisal (Lafayette, Indiana: Purdue University, Division of Education, 1960).

to the specific appraisal problems in this study.

The basic assumption underlying the application of the bi-dimensional approach to educational appraisal is that whatever the school provides (the resources) and whatever it does (the operations) are provided or done in order to attain a specific objective (purpose). From this basic assumption, it follows that the value of what a school does or what it provides is determined by the relative importance of the purpose which the school purports to attain. The present study was complicated by the necessity of translating social data (the trends identified in Part I of the study and ranked in order of the extent to which they should be considered in planning future programs of vocational education) into a system of educational appraisal so that schools in a selected sample might be ranked in the order of which the programs are manifesting the identified conditions and trends. Using the ranked order of the trends as a point of departure, two lists of purposes, one list of twenty-five purposes of vocational agriculture and a second list of twenty-three purposes of industrial education, were prepared. Each purpose was appraised by a jury of educational specialists in terms of the relative importance of the purpose in light of the trend rankings. Following the jury appraisal, a score was assigned to each of the twenty-five purposes of vocational agriculture and to each of the twenty-three purposes of industrial education.

Independent of the scoring of purpose items for importance, operational scores were determined for vocational agriculture and industrial education teachers in the schools in the sample. The operational score was based on (1) the identification of three levels of operation, each level representing types of learning activities appropriate for attaining the purpose; (2) the relative educational value of each level as determined by ratings of juries of educational specialists; and (3) the relative amount of emphasis and effort being exerted to attain purposes at each level of operation.

Using purpose scores and operational scores, an operational aggregate was computed for each teacher and program in the sample of schools. The operational aggregate was based on (1) the relative importance of the purpose, and (2) the operational score indicative of operational effort and emphasis being put forth to attain each purpose. Data were collected to ascertain the material and human resources available to operate the vocational programs in the schools. Appropriate statistical analyses were applied to the data for the purpose of studying the relationship between operational aggregates and (1) the purpose acceptance scores, (2) the school and community variables, and (3) the human and material resource variables. Similarly, analyses were made of the relationship between school and community variable and (1) operational scores, and (2) material and human resource variables.

The following are the steps which were undertaken to accomplish Part II of the study:

Step 1. A list of purposes was prepared for each program, based on the trends identified as Part I of the study, and a review of the literature on purposes of vocational agriculture or industrial education.

Step 2. The list of purposes, together with an abstract of the analysis of trends, showing the rank order of the trends in terms of relevance to planning future programs of vocational education, was submitted to a jury of specialists, including school administrators, curriculum specialists, and specialists in agricultural education or industrial education. The jury members were instructed to rate each purpose in terms of its importance in relation to the trends which were judged to merit highest consideration in planning future programs of vocational education.

a. Tests were made to ascertain the extent to which the three groups of specialists differed in their appraisal of the relative importance of the purposes.

Step 3. For each purpose of vocational agriculture and each purpose of industrial education, a series of three descriptive statements was prepared which represented three levels of operations which may be used to attain the purposes.

Step 4. The lists of purposes, together with the descriptive levels of operation, were submitted to a second jury of educational specialists, including specialists in school administration, curriculum construction, and agricultural education or industrial education, with instructions to rate the relative importance of each level of operation in terms of the potential value of the activities described in each level of attaining the educational purpose.

a. Statistical tests were made to ascertain the extent to which the three groups of specialists differed in their judgments as to the relative importance of each level of operation.

Step 5. Based on the analysis of trends and review of literature, nine instruments were prepared to be used in collecting appropriate data from schools in the selected sample. These instruments included:

a. An instrument to ascertain the extent to which purposes were accepted as goals of the vocational

agriculture programs in the sample.

b. An instrument to ascertain the extent to which purposes were accepted as goals in the industrial education programs in the sample.

c. An instrument to be used to rate operational emphasis and effort in vocational agriculture programs.

d. An instrument to be used to rate operational emphasis and effort in industrial education programs.

e. An instrument to appraise resources for operating vocational agriculture programs.

f. An instrument to appraise resources for operating industrial education programs.

g. A general information survey form.

h. A personal data form for vocational agriculture teachers.

i. A personal data form for industrial education teachers.

Step 6. A sample of eighty-five Indiana high schools was selected, including schools offering vocational agriculture and/or industrial education programs. The eighty-five schools were distributed as follows:

a. Ten small high schools (enrollment 100 to 150) offering vocational agriculture programs only.

b. Ten small high schools offering industrial education programs only.

c. Eleven small high schools offering both vocational agriculture and industrial education programs.

d. Ten medium-size high schools (enrollment 300 to 450) offering industrial education programs only.

e. Twelve medium-size high schools offering both vocational agriculture and industrial education programs.

f. Four medium-size high schools offering trade and industrial education programs.

g. Ten large high schools (enrollment 600 or larger) offering industrial arts programs only.

h. Ten large high schools offering trade and industrial education programs.

i. Eight large high schools offering both industrial education and vocational agriculture programs.

Step 7. The eighty-five schools in the sample were visited, and data were collected as follows:

a. The completed general survey form.

b. The completed instruments showing acceptance of purposes of vocational agriculture and/or industrial education.

c. The ratings for operations on each purpose for each vocational agriculture teacher in the school.

d. The ratings of operations for each purpose for each industrial education teacher in the school.

e. The appraisal of resources for each shop or classroom for each program.

f. The copies of the personnel data sheet for vocational agriculture or industrial education teachers were given to teachers interviewed with requests that these forms be completed and returned to the investigators.

Step 8. The scale values were computed for each purpose of vocational agriculture and industrial education, based on scores assigned to each purpose item by jury members.

Step 9. The mean values for each level of operation for each purpose of vocational agriculture and industrial education were computed from jury ratings.

Step 10. The status scores for the two respective programs studied were derived as follows:

a. An operational score was derived for each purpose based on ratings assigned for operational emphasis by the investigators, and qualified according to the relative educational value of each of three levels of operation, for each purpose, determined

from jury ratings.

b. An operational aggregate for a program was derived, based on the operational score pertaining to each purpose, qualified according to the value of the purpose, and the cross products of qualified operational scores and purpose scores were summed to get the aggregate for each program.

Step 11. The relationship of selected school and community variables and (1) operational scores, (2) operational aggregates, and (3) resource measures were analyzed for the vocational agriculture programs and the industrial education programs.

Step 12. The relationship among purposes, operations, and resources pertaining to the vocational agriculture programs and industrial education programs were analyzed.

Step 13. The data were reviewed and synthesized to ascertain the extent to which existing vocational programs reflect the trends which were judged to merit greatest consideration in planning future programs of vocational education and which served as the basis for developing the appraisal instruments.

SUMMARY OF CHAPTER I

The introductory statement was prepared to give a broad overview of the nature and scope of a study in vocational education. Based on an analysis of societal trends, a purpose-operation-resource model was developed for programs of vocational agriculture and industrial education. The instruments developed to give measuring dimensions to the model served as the basis for judging the efficacy of existing programs.

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CHAPTER II

THE PREPARATION OF DATA-COLLECTING INSTRUMENTS

Part II of the study entitled "Vocational Education in Public Schools as Related to Social, Economic, and Technical Trends" was concerned primarily with ascertaining the extent to which public schools in Indiana were operating programs of vocational agriculture and industrial education which manifested the trends identified and ranked in Part I of the study.[1] For this part of the research 41 vocational agriculture programs and 75 industrial education programs in Indiana high schools were selected to comprise the sample to be studied. The procedures employed in selecting the samples are described in Chapter III of this report. This chapter describes the manner in which the instruments used to collect data for this study were prepared.[2]

I. PROJECT OBJECTIVES AND RESEARCH METHODOLOGY AS GUIDES TO DATA COLLECTION

The basic objectives of this study were:

1. To develop a statement for a contemporary design for programs of vocational education based on the identification of pertinent social, economic, and technical trends determined as being relevant for planning future programs of vocational education.

2. To appraise existing programs of vocational agriculture and industrial education as to purposes, operations, and resources in terms of the extent to which these programs manifest the characteristics set forth in a contemporary design for vocational education.[3]

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[1] F.J. Woerdehoff, N.J. Nelson, and J.K. Coster, Vocational Education in Public Schools as Related to Social, Economic, and Technical Trends: Part I. The Analysis of Trends and Concepts (Studies in Education, No. 1; Lafayette, Indiana: Purdue University, Division of Education), 1960.

[2] The specific objective listed in Chapter I (supra, p. 3) which is treated in this chapter is:

(1.) To prepare a series of instruments to be used in appraising and collecting data regarding the purposes, operations, and resources for each of the two fields — vocational agriculture and industrial education — included in the study.

[3] Cf. F.J. Woerdehoff, N.J. Nelson, and J.K. Coster, "Vocational

Part I of this study reported findings based on the analysis of trends and concepts which culminated in ten characteristics of a contemporary design for vocational education. Part II of this study is concerned with analyzing existing patterns and programs of vocational agriculture and industrial education in a sample of public high schools in terms of the extent to which these patterns and programs manifest the previously identified social, economic, and technical conditions and trends, and to identify variables related to socially accepted programs of these two fields of vocational education.

A design for educational appraisal was employed which resulted in the assignation of a quantitative value to each school program, which made possible the ordering of the school programs on a continuum. The position of a specific school on the continuum was indicative of the extent to which that school, when compared with other schools in the sample, was operating a program which manifested the trends previously identified as meriting consideration in planning future programs of vocational education. The quantitative values assigned programs in the schools were used to conduct a series of statistical analyses to determine if variations in scores assigned to schools were related to a selected number of school and community variables and to the availability and suitability of educational resources. In addition, studies were made of interrelationships among purposes, operations, and resources.

The theoretical construct of the design for educational appraisal used in Part II of the study is described in detail in a separate publication.[4] This bidimensional approach to educational appraisal is based on the primary assumption that the value of what a school is doing (its operations) is a function of the relative importance of the purposes it is attempting to attain. The quantitative value or score used to locate a school on a continuum, which described the extent to which the school is operating a program that manifests contemporary conditions and trends, is a function of the relative importance of the purposes employed in the appraisal process and a gauge of operational effort and emphasis being exerted to attain a specific purpose.

Education in Public Schools as Related to Social, Economic, and Technical Trends" (mimeographed proposal, Purdue University, Division of Education, February, 1958.

[4] J.K. Coster, N.J. Nelson, and F.J. Woerdehoff, A Bidimensional Approach to Educational Appraisal (Lafayette, Indiana: Purdue University, Division of Education), 1960

The foregoing brief description suggests the type of instruments needed to collect data for the study. First, instruments were needed which yielded data as to (1) the extent to which each of a list of purposes was accepted as a goal in the vocational programs of a school, and (2) the relative importance of the several purposes as evaluated by juries of educational specialists in light of the data obtained in Part I of the study. Secondly, instruments were needed (1) to gauge operational emphasis and effort exerted by the schools to attain each purpose, and (2) to obtain indications from separate juries of educational specialists as to the relative value of the suggested operation. Thirdly, instruments were needed (1) to collect data regarding personnel and physical resources in the schools, and (2) to obtain information regarding selected school and community variables.

II. THE TRANSLATION OF SOCIAL DATA TO CRITERIA FOR APPRAISAL

After the design for appraisal had been developed, the immediate problem was to translate the social data obtained in Part I of the study to criteria for appraisal. This was done by using the analyses of trends and opinions as guide lines for formulating two sets of educational purposes -- one for vocational agriculture and the other for industrial education. These purposes served as a basis for developing other instruments to be used in appraising school programs in terms of the extent to which the programs were manifesting contemporary conditions and trends. The purposes were developed external to and independent of the educational programs studied, and thus were applied as part of criteria for appraisal.[5]

A resume of the social data reported in Part I of the study was used (1) as a guide in constructing statements of purposes for programs of vocational agriculture and industrial education, (2) as a frame of reference for educational specialists to use as a basis for making judgments concerning the relative importance of each purpose, and (3) as a frame of reference for juries of educational specialists to use in assigning values to operational levels appropriate for specific purposes.

A Contemporary Design for Vocational Education[6]

As an intermediate step in the process of translating social

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[5] Ibid., Chapter II.

[6] Woerdehoff, Nelson, and Coster, Vocational Education in Public Schools as Related to Social, Economic, and Technical Trends: Part I. The Analysis of Trends and Concepts, op. cit.

data to criteria for appraisal, a statement for a contemporary design for vocational education was prepared, which included ten characteristics of socially adapted programs of vocational education. The design was based on the results of an analysis of trends and opinions. This sub-section presents a brief review of the results of analyses of trends and opinions, and then presents the characteristics of a design for vocational education.

Analyses of trends. A list of 55 trends potentially related to vocational education was identified in Part I of the study. These trends were rated by a jury of 430 specialists in six fields -- economics, sociology, philosophy of education, vocational education, management, and labor -- with regard to the extent each trend should be considered in planning future programs of vocational education. Ratings were summed across items to obtain a score for each item indicative of its relative importance in planning future programs of vocational education. The list of trends, ranked in descending order of importance, is shown in Table II-1.

Examination of the trends ranked highest in importance indicated that these trends may be grouped, for convenience, into three major categories:

1. Trends referring to extension and expansion of educational programs. Foremost among the trends ranked highest in importance, as shown in Table II-1, are trends which allude to the continual extension and expansion of educational programs. Educational statistics indicate that the average number of years of schooling completed by adults is increasing, and concomitantly, the number of years youth spend in school prior to entering the labor force likewise is increasing. In addition, an ever increasing number of adults is enrolling in post high school educational programs of less than college grade, and, at the same time, the number of terminal education programs involving two years of post high school education is increasing. These trends are likely to be accented as colleges and universities become increasingly more selective with regard to enrollment policies.

Within the secondary education program, trend data indicated that the proportion of high school students enrolled in vocational programs is increasing, and there are indications that the public schools are performing an increasing number of functions which in former years were vested in other agencies.

2. Trends referring to the nature and level of occupational activity. Closely associated with trends which denote extension and expansion of education are trends which pertain to increasing complexity of the occupational structure. In its simplest form, this series of trends is based on both an actual and relative decrease in

TABLE II - 1

A GROUP OF FIFTY-FIVE TRENDS LISTED IN DESCENDING RANK ORDER, BASED ON RATINGS OF 430 RESPONDENTS

Rank	Trend
1	The ratio of occupations requiring specialized training to occupations requiring little or no training is increasing.
2	The number of years youth spend in education prior to entering the labor force is increasing.
3	The number of new occupations resulting from technological developments in business, industry, and agriculture is increasing.
4	The demand for persons with education beyond the high school level is increasing.
5	The ratio of persons in the labor force employed as craftsmen (skilled), operatives (semi-skilled), and technicians to persons employed as unskilled laborers is increasing.
6	The percentage of adults enrolled in educational programs in public schools is increasing.
7	Expenditures for research and development in agriculture and industry are expanding rapidly.
8	The number of terminal education programs involving two years of post high school education is increasing.
9	The percentage of students in public secondary schools enrolled in vocational education programs is increasing.
10	The range of occupations in which women are employed is increasing.
11	American colleges and universities are becoming more selective with regard to admission policies.
12	Training programs in industry designed to prepare, upgrade, and retrain persons for employment are increasing.
13	The ratio of the number of persons engaged in processing, distributing, and providing services to the number of persons engaged in production is increasing.

TABLE II - 1 (continued)

Rank	Trend
14	The average number of years of schooling completed by adults in the total population is gradually increasing.
15	The percentage of persons in the labor force employed in supervisory, managerial, and professional positions is increasing.
16	Persons over 45 years of age are experiencing increasing difficulty in obtaining employment.
17	Rapid social, economic, and technological changes in American society are engendering increased uncertainty in personal values and social direction.
18	The agricultural and industrial productivity of the nation gradually is being concentrated into a relatively small number of units of production.
19	Specialized training and employment opportunities for handicapped persons are increasing.
20	The ratio of the number of persons employed by corporations, institutions, and other persons to the number of self-employed persons is increasing.
21	The number and percentage of women, especially married women, in the total labor force is increasing.
22	The incidence of diseases and disorders of a psychological or emotional origin is increasing and is receiving more attention as a major health problem in America.
23	The management of agricultural and industrial productivity is being shifted gradually from owners to managerial persons.
24	Expenditures for and participation in leisure time and recreational activities are increasing.
25	Management is becoming increasingly concerned about the physical, mental, and emotional welfare, physical comfort and safety of the employee.

TABLE II - 1 (continued)

Rank	Trend
26	The schools are performing and accepting major responsibilities for an increasing number of functions which formerly were vested with the home, church, and other agencies.
27	The American people are becoming increasingly conscious of problems and practices pertaining to health and safety.
28	The number of occupations for which licenses or certificates are required is increasing.
29	Differences in social and economic characteristics of rural and urban groups are diminishing.
30	Individuals are becoming increasingly more dependent on secondary (second-hand) media of communication as sources for interpretation of information.
31	The American people are becoming increasingly security conscious and are participating more extensively in plans for pensions, health and life insurance, and social welfare programs provided by industry and government.
32	The range and scope of family activities and occupational opportunities (due in part to increased units of private transportation) are expanding.
33	Geographical mobility is increasing for highly educated workers.
34	America is moving progressively toward a homogeneous "middle class" society.
35	The percentage of the labor force in farming is declining.
36	The percentage of persons in the labor force who are employed on a second job, either part-time or full-time, is increasing.
37	The percentage of persons in the labor force who are members of organized labor unions is increasing.
38	The percentage of youth who serve in military service prior to entering the labor force is increasing.

TABLE II - 1 (continued)

Rank	Trends
39	Interest in and acceptance of improved dietary practices and higher levels of nutrition (e.g., high protein diet, vitamins, calorie content) are increasing.
40	The social and economic life of the nation is becoming more centralized, standardized, and organized into formal patterns.
41	Purchasing habits of the American people are changing with the use of credit buying, and long term payments are increasing.
42	The percentage of the population classified as "rural-non-farm" is increasing.
43.5	The percentage of the total national income received by agriculture is declining.
43.5	The ratio of disposable income to total income is declining, with taxes taking a higher percentage of total income.
45	The utilization of synthetic products, low-grade materials, and by-products is increasing.
46	Interest patterns of family members are becoming increasingly varied and oriented toward groups and activities outside the home.
47	The percentage of the population dependent upon incomes from pensions, annuities, and Social Security is increasing.
48	The number of persons over 65, who are not gainfully employed, is increasing.
49	The political life of the nation is becoming more centralized and organized into formal bureaucratic patterns.
50	Sources of value patterns of American people are changing from foundations in eternal value to foundations in social usage.
51	The proportion of land used for purposes other than farming (e.g., transportation, industry, and recreation) is increasing.

TABLE II - 1 (continued)

Rank	Trend
52	Secondary groups (e.g., lodges, clubs, and unions) are becoming increasingly important to individuals, and are claiming a larger share of individual time, energies, and loyalties.
53	The percentage of the total income received by the middle 60 percent of income recipients is increasing slightly.
54	The center of population is shifting towards western and south-western regions of the United States.
55	The percentage of the total population claiming affiliation with a religious organization is increasing.

the number of persons employed in higher levels of occupational activity — as technicians, craftsmen, and semi-skilled operators. Directly related to this trend is the gradual increase in the ratio of persons employed in occupations requiring specialized training to persons employed in occupations requiring little or no training. And closely associated with this trend is the increase in number of persons employed in supervisory, managerial, and professional positions. Another ramification is the increasing number of occupations which are subject to license and certification requirements. Changes in the occupational structure of the labor force also are manifested in the creation of new occupations, and in the constant establishment of training programs in industry designed to upgrade and retrain employees for new or advanced positions.

In addition to changes that are taking place which suggest a vertical (upgrading) movement of the labor force, other trends are in force which involve change on a horizontal plane. Expenditures of funds for research and development are constantly increasing, and a by-product of these expenditures is a relative decrease in the number of persons employed in processing, distributing, and providing services.

Another dimension of trends in this general category pertained to handicapped and older workers. Data indicate that training and employment opportunities for handicapped workers are increasing, but concomitantly, there are indications that unemployed workers 45 years of age and older are experiencing increasing difficulty in obtaining employment.

Of special concern are trend data that indicate that the number and proportion of women in the labor force are increasing, and also, that the range of occupations in which women are employed, likewise, is increasing.

3. Trends referring to the changing nature of social and economic patterns. A number of trends related to the changing nature of social and economic patterns of American society were identified in the investigation of trends, and a number of these trends received scores sufficiently high to suggest that they should be considered in planning future programs of vocational education. One group of these trends was centered in the general trend that the social and economic life of the nation is becoming more centralized, standardized, and organized into formal patterns. Specific ramifications of this general trend include the concentration of agricultural and industrial productivity into a smaller number of units of production; the increase in ratio of the number of persons employed by corporations, institutions, and other persons to the number of persons who are self-employed; and the shift of management of industry and agriculture from owners to managerial persons. Closely related to these

trends are trends which denote a gradual decrease in the number and percentage of persons engaged in farming, and the increase in the percentage of the population classified as "rural non-farm." Incidentally, there are indications that unique social and economic characteristics which once were associated with rural and urban societies are diminishing.

Another series of trends is centered in the tendency of the American people to become increasingly conscious regarding security. There are indications that rapid changes in American society are engendering increased uncertainty with regard to personal values and social direction. A practical ramification of these trends is the tendency of management to become increasingly concerned about the physical, mental, and emotional welfare and physical comfort and safety of employees. American people, themselves, are becoming increasingly conscious of problems and practices pertaining to health and safety. Then, too, the incident of diseases and disorder of psychological or emotional origin is increasing, and this trend is receiving increased attention as a major health problem in America.

Two other trends were identified and rated relatively high in terms of importance in planning future programs of vocational education. First, population mobility is constantly increasing, especially with regard to highly educated workers. Second, constant increments in productivity per employed worker has resulted in a gradual reduction in the work week, and this, in turn, is reflected in growing expenditures for and participation in leisure time and recreational activities.

Analyses of opinions of how schools should react to the trends. Not only did the jury members rate trends in terms of the extent to which they should be considered in planning future programs of vocational education, but the respondents also expressed opinions as to how schools should react to the trends. Opinions regarding action were registered by selecting one of four possible responses, viz., (1) impede, (2) accelerate, (3) neither impede nor accelerate, and (4) disregard.

Results of analyses of data regarding how schools should react to the trends denoted a close relationship between the relative importance of the trend and opinions as to whether schools should take positive action to accent the progress of the trends. Of the twenty trends which ranked highest in importance, predominate opinion indicated that the schools should take positive action (either accelerate or impede) with regard to fifteen of the trends. Of the twenty trends which ranked lowest in importance, predominate opinion indicated that the schools should take positive action with regard to only one trend. For the remaining trends, the consensus was that either the schools

should take no positive action with regard to the trends (to neither impede nor accelerate response) or should disregard the trends. Incidentally, results of analyses indicated that as trends were rated lower in importance, there was an accompanying increase in the proportion of respondents who indicated that the trend should be disregarded in curriculum planning.

Analyses of opinions related to basic concepts regarding vocational education and the role of school in society. The questionnaire used to collect data for Part I of the study included four items included to establish frames of reference against which the jury rated the importance of each trend in planning future programs of vocational education, and also, how the school should react to each trend. These items dealt with (1) the nature of vocational education, (2) the clientele to be accommodated by vocational programs, (3) the importance of vocational education, and (4) the role of the school in society. Although primarily included to obtain indications of frames of reference, analyses of opinions, per se, yield indications as to the characteristics of desirable vocational programs.

1. Opinions regarding the nature of vocational education. Respondents were asked to select one of four possible responses to describe their beliefs about vocational programs as are currently operated in the public schools, then to select a response to indicate what should be the nature of vocational programs in the future. The four responses were: (1) a program emphasizing skills and related knowledge, (2) a program emphasizing occupational adjustment, (3) a program emphasizing occupational adjustment and the relationship between occupational proficiency and societal welfare, and (4) a broad, general program upon which subsequent preparation for occupational proficiency may be based. A pronounced shift was observed between existing conceptions of the nature of vocational programs and the nature of vocational programs as they should be operated in the future. Whereas 181 or 43.0 per cent of the 421 persons responding indicated that vocational programs are emphasizing skills and related knowledge, only 30 or 7.0 per cent of 428 respondents indicated that this response should describe future programs of vocational education. And whereas only 33 or 7.8 per cent of respondents selected response category three and 62 or 14.7 per cent selected response category four to describe their conceptions of existing programs, 130 or 30.4 per cent and 183 or 42.7 per cent selected response categories three and four respectively, to describe what should be the nature of vocational programs in the future.

2. Opinions regarding the clientele to be accommodated by vocational programs. By selecting one of three possible response categories, respondents described their current beliefs about the clientele now being accommodated by existing vocational programs,

and their beliefs about the clientele that should be accommodated by future vocational programs. The response categories included: (1) students who are not likely to graduate from high school, (2) students who may graduate from high school, but who do not plan to go to college, and (3) students who are interested in and have aptitude for an occupation for which training is being offered, regardless of future plans for post-high school education. Again a decided shift in opinions as to what is now the clientele served by vocational programs to opinions as to what should be the clientele served by future programs was observed. Of 420 respondents who expressed their beliefs as to the clientele currently being accommodated by vocational programs, 102 or 24.3 per cent selected response category one, and only 158 or 37.6 per cent selected response category three. By contrast, when reacting to the clientele that should be accommodated in vocational programs of the future, only 10 or 2.4 per cent of 420 jury members responding selected response category one, compared with 330 or 78.6 per cent who selected response category three.

3. Opinions regarding the importance of vocational education. In light of their responses to items dealing with the nature of vocational programs and the clientele to be accommodated by these programs, respondents were asked to appraise the relative importance of vocational programs, both as they are currently believed to be operated in public schools and as they should be operated in the schools in the future. Opinions of importance were registered by selecting one of four possible responses: (1) of little or no importance, (2) of some importance, and (3) of very great importance. A marked shift also was noted in responses. When evaluating the importance of vocational programs as they are believed to be operated in public schools, 20 or 4.8 per cent of 421 persons responding checked response category one, and 174 or 41.3 per cent checked response category three. But when respondents reacted to what should be the importance of vocational programs in the future, only 6 or 1.4 per cent of 431 respondents checked response category one, compared with 352 or 81.7 per cent who checked response category three.

4. Opinions of respondents regarding the role of school in society. To obtain an indication of the philosophic orientation of the respondents with regard to conceptions of the role of school in society, jury members were asked to check responses to indicate what they believe is now the role of the public schools in society and what should be the role of the public schools in society. The possible responses included (1) the school is or should be an agent primarily concerned with conserving the cultural heritage, (2) the school is or should be an agent concerned with reflecting the existing social order, and (3) the school is or should be an agent concerned with redirecting and reconstructing society. Observation of

the responses to this item indicated a wide difference of opinion between what was believed to be the existing role of the school and what the role of the school should be in society. Of the 405 respondents who checked one of the three response categories for what is now, 168 or 41.5 per cent selected response category one, and 59 or 14.6 per cent checked response category three. But in reacting to what should be the role of the school in society, 51 or 12.9 per cent of the 396 respondents who selected one of three responses selected response category one, whereas, by contrast, 207 or 52.3 per cent checked response category three.

A contemporary design for vocational education. Based on analysis of trend data and concepts related to vocational education, a statement of a contemporary design for vocational education was prepared.[7] The statement included a list of ten characteristics of socially adapted programs of vocational education, as follows:

1. Vocational programs of education should be based on the increasing complexity and range of the occupational structure, and should provide instructional activities which challenge and meet the needs of students with a wide range of scholastic and special aptitudes and interests.

2. Vocational programs of education should be broadly conceived, and should include instructional activities designed to facilitate initial entrance into the labor force as well as to develop an adequate background upon which subsequent specialized training may be based.

3. Vocational programs of education should be organized to emphasize broad technical and scientific understandings, and should include instructional activities designed to permit the application of technical knowledge and understanding to practical occupational situations.

4. Vocational programs of education should be directed toward the development of appreciations and understandings of the economic and social contributions of occupations to society, together with the development of favorable attitudes toward occupations, and, further, should be designed to develop dynamic qualities of leadership needed to reconstruct and redirect societal conditions under which the individual is to work.

5. Vocational programs of education should be oriented toward the increasing importance of managerial behavior in modern society,

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[7] Woerdehoff, Nelson, and Coster, op. cit., pp. 62-64.

and should include instructional activities designed to emphasize reflective thinking, problem solving, and creativity in work as well as in the organization of human and material resources into efficient and effective service and production units.

6. Vocational programs of education should be organized to emphasize the abilities essential in human relations and occupational adjustment, with special emphasis on developing, understanding, and appreciating the social importance of personal traits pertaining to work habits, interpersonal relations, and employer-employee relations.

7. Vocational programs of education should be organized to include adequate guidance services related to all phases of occupational adjustment, including assistance in selecting, preparing for, entering into, and adjusting to changes in occupational activity.

8. Vocational programs of education should include for specialized training programs designed to facilitate occupational mobility both vertically (upgrading of occupational activity) and horizontally (retraining for new or different occupations at a constant level of occupational activity) for established workers.

9. Vocational programs of education should be organized to emphasize the development of abilities and attitudes designed to promote emotional maturity, economic security, and physical well-being and safety.

10. Vocational programs of education should be organized to emphasize the development of abilities related to occupational endeavor which may be utilized as leisure-time activities.

III. THE CONSTRUCTION OF INSTRUMENTS TO APPRAISE PURPOSES OF VOCATIONAL AGRICULTURE AND INDUSTRIAL EDUCATION

Once the basic social data obtained from Part I of the study had been analyzed, and the contemporary design for vocational education had been formulated, attention was focused on preparing lists of purposes of vocational agriculture and industrial education. The lists of purposes served as the point of departure for appraising a sample of vocational agriculture programs and a sample of industrial education programs, drawn from Indiana high schools, in terms of the extent to which these programs were being operated so as to manifest the previously identified trends which were judged to merit consideration in planning future programs of vocational education. Section III describes the procedures used to develop two lists of purposes and also the construction of instruments which were used, independently, in determining a quantitative hierarchy which represented the rela-

tive importance of the purpose item prepared for each program and in determining the extent to which school personnel in the selected samples were accepting each purpose as goals of their vocational programs.

Procedures Used in Constructing Purposes

The procedures used in constructing purposes were identical for both programs, and are delineated as follows:

1. An exhaustive survey was made of literature on purposes of both vocational agriculture and industrial education in order (1) to ascertain the scope of these programs as they were being operated in the public schools, and (2) to identify the form in which purposes of these programs are phrased. Primary sources of information consulted included the National Vocational Education Act of 1917,[8] official publications of the Vocational Education Division of the United States Office of Education,[9] the Evaluative Criteria,[10] publications of state departments of public instruction prepared to guide the development of vocational agriculture [11] and industrial education[12] programs in the several states, and standard reference works in the two fields.[13]

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[8] Public Law 341, Sixty-fourth Congress, Senate Bill 703.

[9] Public Vocational Education Programs (Pamphlet No. 117; Washington, D. C.; Office of Education, U. S. Department of Health, Education, and Welfare), 1957; Administration of Vocational Education (Vocational Education Bulletin No. 1, Revised; Washington, D. C.: Office of Education, Federal Security Agency), 1948; Educational Objectives in Vocational Agriculture (Vocational Division Monograph No. 21, Revised; Washington, D. C.; Office of Education, U. S. Department of Health, Education, and Welfare), 1955; The Operation of a Local Program of Trade and Industrial Education (Vocational Division Bulletin No. 250; Washington, D. C.: Office of Education, U. S. Department of Health, Education, and Welfare), 1957.

[10] Cooperative Study of Secondary School Standards, Evaluative Criteria (1950 Edition; Washington, D. C.: Cooperative Study of Secondary School Standards), 1950.

[11] Cf. Vocational Agricultural Education in North Carolina Public Schools (Publication No. 276; Raleigh, N. C.: State Department of Public Instruction), 1951.

[12] Cf. "A Guide for Administering and Supervising Industrial Education Programs" (mimeographed report; California State Department of Public Instruction, Sacramento, California), 1956.

2. From the ten characteristics of socially adapted programs of vocational education listed in the contemporary design for vocational education, purpose areas in each of the two programs were identified and statements of purposes were prepared.

3. A revised list of purposes of the two programs was prepared, based in part on the contemporary design for vocational education and in part on existing statements of purposes of the two programs. The purpose items selected for each field actually represented a relatively wide range of educational activities. The inclusion of the wide range of purpose areas was done deliberately so that the purpose item subsequently could be appraised for importance and quantitative hierarchies established in light of the contemporary design for vocational education.

The list of purposes of vocational agriculture. For vocational agriculture a list of twenty-five purposes was prepared, stated as general abilities to be engendered. The purpose items included not only abilities needed for success in the occupation, but also abilities pertaining to occupational adjustment -- to selecting, preparing for, becoming established in and adjusting to occupational demands, abilities pertaining to understanding and appreciating the social significance of the occupation, and abilities pertaining to the development of desirable personal characteristics essential for occupational success. The twenty-five purposes, listed in random order, are as follows:

1. To assist students in developing an appreciation of the economic contributions of agriculture to society.

2. To assist students in developing an appreciation for and an understanding of technological developments in agriculture.

3. To assist students in developing traits, such as cooperation, industry, and initiative, essential for successful occupational adjustment and human relations.

4. To assist students in developing the ability to organize and apply technical agricultural knowledge and information to the solution of farm problems.

5. To assist students in developing abilities to maintain, operate, and adjust farm power, machinery, and equipment.

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13 Cf. L.J. Phipps and G.C. Cook, A Handbook on Teaching Vocational Agriculture (Sixth Edition; Danville, Ill.: The Interstate), 1952; R.W. Roberts, Vocational and Practical Arts Education (New York: Harper and Brothers), 1957.

6. To assist students in developing abilities essential to maintaining healthful and safe conditions on the farm and in the home.

7. To assist persons in exploring the redirection of agricultural patterns, practices, and concepts.

8. To assist students in developing abilities essential for assuming leadership and citizenship roles.

9. To assist persons in understanding and interpreting the role of agriculture in society.

10. To assist students in developing mechanical skills, such as carpentry, welding, and cold metal work, involved in farm improvement and maintenance.

11. To assist students in developing abilities to understand marketing processes and to market products and services profitably.

12. To assist students in developing non-mechanical (i.e., manipulative and identification) skills, such as pruning fruit trees, identifying weed seeds, culling hens, involved in farm production and improvement.

13. To assist persons in critically analyzing the economic requirements essential for establishing and maintaining efficient farming units.

14. To assist out-of-school youth and adults enter into and/or become more effectively established in farm related occupations.

15. To assist students in exploring the possibilities of employment in agricultural occupations.

16. To assist persons in developing interests and abilities of an avocational nature (e.g., aesthetic appreciations and leisure time activities, such as landscaping, gardening, and establishing lawns), related to agriculture.

17. To assist high school students in formulating realistic occupational goals.

18. To assist students in developing an appreciation for the place of agriculture in the emerging pattern of American society.

19. To assist out-of-school youth and adults enter into and/or become more effectively established in farming.

20. To assist students in developing abilities to organize land, labor, and capital resources into an efficient producing unit.

21. To assist high school students in obtaining employment in appropriate agricultural occupations.

22. To assist students in developing abilities to procure and utilize efficiently equipment, supplies, and services.

23. To assist persons established in farming in adjusting to changing occupational conditions in farming.

24. To assist academically talented students in preparing for education beyond the high school level.

25. To assist students in developing an understanding of scientific knowledge, concepts, and methods related to agriculture.

The list of purposes for industrial education. For industrial education a list of twenty-three purposes was prepared, also stated as general abilities to be engendered. The range of abilities was similar to that prepared for vocational agriculture, and included abilities needed for occupational success, abilities pertaining to occupational adjustment, abilities related to understanding and appreciating the social significance of the occupation, and abilities related to personal growth and development. The twenty-three purposes, listed in random order, are as follows:

1. To assist students in developing an appreciation for the social significance of the "world of work."

2. To assist students in developing an understanding of related technical knowledge and information pertaining to industrial occupations.

3. To assist students in developing the ability to select, care for, and use industrial products wisely.

4. To assist students in developing identification skills, such as identifying woods, metals, tools, and parts of equipment, involved in industrial processes.

5. To assist students in developing an appreciation for and an understanding of technological developments in industrial processes.

6. To assist students in developing an appreciation for high standards of workmanship.

7. To assist persons in developing interests and abilities of an avocational nature, such as may be utilized in hobbies and home repair, which are related to industrial occupations.

8. To assist high school students in formulating realistic occupational goals.

9. To assist persons, established as industrial workers, in adjusting to changing needs, goals, and opportunities in industrial occupations.

10. To assist currently employed workers in upgrading their level of occupational proficiency.

11. To assist students in developing abilities essential to maintaining healthful and safe conditions on the job.

12. To assist students in developing traits such as initiative, cooperation, and resourcefulness, essential for successful occupational human relations.

13. To assist students in exploring the possibilities of employment in industrial occupations.

14. To assist students in developing competencies in understanding and utilizing scientific concepts and methods involved in industrial processes.

15. To assist academically talented students in preparing for education beyond high school.

16. To assist students in developing an appreciation of the economic contributions of industrial workers to society.

17. To assist persons in developing a favorable attitude toward industrial occupations and industrial education in the community.

18. To assist students in developing basic operational skills that apply to a wide range of industrial occupations.

19. To assist students in developing abilities essential for leadership and citizenship roles.

20. To assist students in developing abilities to form sound judgments and solve problems related to industrial processes.

21. To assist students in developing an appreciation and an understanding of labor-management relationships.

22. To assist students in developing specific operational skills essential for initial employment in a specific occupation.

23. To assist high school students in obtaining employment in appropriate industrial occupations.

The Design of the Instruments

The preceding lists of purposes for programs of vocational agriculture and industrial education were used to design instruments to collect data pertaining to (1) the importance of purposes as judged by a jury of specialists in school administration, curriculum construction, and agricultural and industrial education and (2) the extent to which purposes were accepted by the schools in the sample.

Instruments for rating the importance of purposes. The instruments submitted to the jurors to secure ratings of the importance of the stated purposes for programs of vocational agriculture and industrial education provided an opportunity to rate each purpose on a nine point scale. The jurors were requested to rate the importance of each purpose in relation to societal trends as summarized in an accompanying abstract.[14] The nine point scale, which included response categories ranging from no importance to very great importance, was used to permit ample opportunity for the jurors to respond with discrimination. These instruments titled: (1) Rating of Purposes: Vocational Agriculture (Form 11) and (2) Rating of Purposes: Industrial Education (Form 12) are reproduced in Appendix A.[15]

Instruments for rating the acceptance of purposes. The instruments submitted to the schools to secure ratings of purpose acceptance as goals of the programs of vocational agriculture and industrial education provided an opportunity for the respondents to react to purpose acceptance on a five point scale. The scale values for the extent of purpose acceptance ranged from no extent to very great extent. The response to these instruments represented the combined judgment of teachers of either vocational agriculture or industrial education and the school principal of each school in the sample. These instruments entitled: (1) Vocational Agriculture: Rating of Purpose Acceptance (Form 5) and (2) Industrial Education: Rating of Purpose Acceptance

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[14] F.J. Woerdehoff, N.J. Nelson, and J.K. Coster, An Abstract of the Analysis of Social, Economic, and Technical Trends and Opinions Related to Vocational Education (Studies in Education, No. 3; Lafayette, Indiana: Purdue University, Division of Education), 1959.

[15] See infra, pp. A - 60 to A - 68

(Form 8) appear in Appendix A.[16]

IV. THE CONSTRUCTION OF INSTRUMENTS USED IN OBTAINING OPERATIONAL SCORES FOR VOCATIONAL AGRICULTURE AND INDUSTRIAL EDUCATION

The instruments developed for appraising operations of vocational agriculture and industrial education programs were designed to facilitate getting a score for each school indicative of the relative amount of operational emphasis and effort being exerted to attain a specific purpose. The assignation of an operational score for each purpose necessitated the construction of two separate instruments for each of the two programs included in the study. One instrument was used as a guide to rating operations in the school. The second instrument was used to obtain an indication of the relative educational value of different types or levels of operations appropriate for a specific purpose. This indication was obtained from two juries of educational specialists, one jury for vocational agriculture and the other jury for industrial education.

Levels of Operation

The method used in the study for determining operational scores involved the identification of three levels of operation for each of the twenty-five purposes of vocational agriculture, and for each of the twenty-three purposes of industrial education. The operational levels referred to a grouping of potential teaching activities which were judged to be appropriate for attaining each purpose into three strata. The strata were based on the type, extensiveness, and educational soundness of the varied activities. The three levels were designated Levels "A", "B", and "C". Level "A", generally described with relatively simple operation that would be carried out in the classroom or shop through study or discussion directed by the teacher. Level "C" described operations which alluded to extensive effort on the part of the teacher and/or extensive material resources provided by the school. Level "C" activities involve more sophisticated teaching methodology than Levels "A" or "B", and were designed primarily to manifest the impact of the previously identified and analyzed conditions and trends on teaching activities. Level "B" activities ranged between the Level "A" and Level "C" activities.

The construction of the three levels of operation for each purpose was based on consideration of a number of factors. Literature on teaching techniques and educational activities appropriate to each of the two programs was examined. So, too, was the theory of educational

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[16] See infra, pp. A - 13ff.(Form 5) and A - 37ff.(Form 8).

practice. But major consideration in constructing the levels was given to the characteristics of vocational education derived and listed previously in this chapter. To this extent, then, the trends identified in Part I of this project and the reactions to the basic concepts of vocational education were manifested both in the purposes of vocational education for the two fields studied and in the levels of operation which were designed to be used in ascertaining the extent to which the purposes were being obtained in the schools.

The use of level of operation was based on two major assumptions: In the first place, activities associated with levels of operation are likely to vary with regard to effectiveness in attaining purposes. In the second place, schools exerting maximum effort to attain purposes are more likely to use a variety of teaching activities than schools exerting little or no effort to attain a purpose. The use of three levels was decided upon after extensive experimentation in constructing statements describing levels of operation. The use of two levels did not provide adequately for describing and delineating among the range of activities appropriate for attaining a purpose. And the use of more than three levels did not provide for distinct grouping of activities into recognizable levels.

The discrimination desired in the series of three levels of operation is illustrated by one of the purposes of vocational agriculture - to assist students in developing the ability to organize and apply technical knowledge to the solution of farm problems. The three levels constructed for this purpose were:

Level A. Direct study and discussion of technical agricultural subject matter.

Level B. Identify general problems of farmers, and decide on solution of problems in terms of appropriate technical data.

Level C. Identify specific problems related to specific farm operations, decide upon a solution, and test and evaluate conclusion under actual or simulated job conditions.

At the lowest level of operation, teaching activities are limited to giving assignments, directing discussions, and studying underlying concepts and principles related to agriculture as part of classroom work. The study of animal nutrition, for example, might be limited to an analysis of the nutritive needs of livestock and on the feeds which supply the elements needed for adequate nutrition. At a somewhat higher level the teacher may direct and engage in activities which involve an analysis of problems of farmers or students of vocational agriculture

with regard to feeding livestock. After the problems are analyzed, technical data pertaining to nutritive needs of livestock and the feeds which meet nutrition needs may be consulted. Then general conclusions are agreed upon, based on the analysis of problem and the technical data. At a higher level, the school may focus its educational activities on analyzing specific problems with regard to animal nutrition (e.g., how should farmer A or student B feed his cows in order to attain milk production). Each student then would arrive at a solution based on analysis of nutrient needs and feeds required to meet these needs, test the conclusion under actual farm conditions, and evaluate the efficacy of his conclusions. The highest level of operation for this purpose, it will be noted, takes into consideration trends such as increasing emphasis upon managerial behavior, and increasing attention to scientific methods and practices.

Procedures Used in Constructing Levels of Operation

After the pattern for appraising operational effort and emphasis had been developed, attention was focused on preparing appropriate statements to delineate three levels of operation for each of the twenty-five purposes of vocational agriculture and the twenty-three purposes of industrial education. The literature on educational methodology, in both general and applied areas, was consulted as part of this step. Lists of potential operational procedures were identified for each purpose in each of the two fields. These potential operational procedures were drawn from current educational practice, from the literature on methodology, and from identification of procedures which were not being used extensively in the schools, but which were judged to be appropriate in the light of the ten characteristics of socially adapted programs of vocational education.

The potential operational procedures listed for each purpose then were placed in one of three groups. Operational procedures which tended to center in study and discussion type activities were placed in one group. Operational procedures which tended to center in student activities were placed in a second group. The third group was reserved for advanced, specialized procedures, which also included the procedures which were developed from the data presented in Part I of the study. The three groups of procedures became the basis for delineating the three levels of operation. Statements describing three levels of operation for each purpose were prepared, with special attention given to describing levels of operation so that practically all potential procedures were subsumed under one of the three levels.

The Design of Instruments

The two lists of purposes presented in Section III of this chapter were used to construct a total of four data collecting instruments for

operations. Two instruments, one for vocational agriculture and one for industrial education were prepared to be used as a guide for conducting the observational interview in the schools. Two other instruments, one for vocational agriculture and one for industrial education, were prepared to be submitted to two additional juries of educational specialists to get ratings of the relative importance of the relative value of each of three levels of operation for each purpose.

The design of observational interview guides. The instrument prepared for appraising school programs for operations were designed to facilitate the employment of a technique for appraisal of operations labeled the observational interview. The observation interview technique , featured structured interviews with teachers and supervisors or directors of vocational education in the two programs included in the study, and observations of both teaching procedures being employed and material resources which were available for attaining the purpose. Provisions were needed to assign ratings for each level of operation for each purpose based on a number of considerations such as (1) the relative amount of time devoted to the purpose, (2) the scope learning activities utilized in attaining the purpose, (3) the importance attached to teaching techniques, as denoted both by the oral interview and by observations in the classroom, laboratory, or shop, (4) the overall quality and extensiveness of activities indicated by interviews (5) the indications of adequacy of resources which permit operations to attain a purpose, and (6) the visual evidence of extensiveness of operation to attain a purpose.

To scale operational emphasis and effort in the schools, provisions were made on the instrument for interviewers to assign a rating ranging from 0 to 4 for each level of operation for each purpose. A rating of 0 indicated no activity at the specified level. Ratings of 1, 2, 3, and 4 indicated limited, moderate, considerable, and very great activity, respectively. Ratings were registered on the instrument by encircling the appropriate numerical category.

The two instruments so prepared were Vocational Agriculture: Appraisal of Operational Levels (Form 6) and Industrial Education: Appraisal of Operational Levels (Form 9), both of which are included in Appendix A.[17]

The design of instruments to obtain ratings of the educational value of each level of operation. Operational scores were assigned to programs for each purpose, based on a rating assigned by interviewers for each level and the relative educational value of the three levels of operation. The procedures employed in determining operational scores are discussed more fully in Chapters V (for vocational agriculture) and XI (for industrial education). The brief reference to the scoring system is made at this point to indicate the need for constructing instruments to or by which the relative educa-

[17] Infra, pp. A - 18ff. (Form 6) and A - 42ff. (Form 9).

tional values of the three levels of operation for each purpose were determined.

Two juries of educational specialists were used to determine the relative values for levels of operation. The juries included specialists in school administration, curriculum construction, and agricultural education or industrial education. The purposes of the specific program -- i.e., vocational agriculture or industrial education -- were listed on the form, followed by the levels of operation for each purpose. The statement for each level was followed by a ten point scale, as illustrated: for Purpose Number 1 for vocational agriculture below:

1. To assist students in developing an appreciation of the economic contributions of agriculture to society.

A. Direct study and discussion of the economic importance of agriculture. A 1 2 3 4 5 6 7 8 9 0

B. Conduct appropriate studies to determine the economic importance of agriculture in the community. AB 1 2 3 4 5 6 7 8 9 0

C. Direct analysis of data from local, state, and national sources to determine present and future importance of economic contribution of agriculture. ABC 1 2 3 4 5 6 7 8 9 0

Cumulative ratings for the three levels were requested. Thus the instruction indicated that the jury member was to encircle the value he would assign a school operating effectively at Level "A" only. Then he was to encircle the value he would assign a school operating effectively at Levels "A" plus "B". Lastly he was to encircle the value he would assign a school operating effectively at Levels "A" plus "B" plus "C". By using cumulative ratings, the jury member was not forced to make a decision as to which level of operation should receive highest priority. Rather he simply was asked to register his judgment of the relative value of each level.

The two instruments prepared for obtaining indication of the relative educational value of each level of operation were Appraisal of Operational Levels: Vocational Agriculture (Form 13), and Appraisal of Operational Levels: Industrial Education (Form 14),

Both of these instruments appear in Appendix A.[18]

V. THE CONSTRUCTION OF INSTRUMENTS USED TO RATE ADEQUACY OF MATERIAL RESOURCES FOR PROGRAMS OF VOCATIONAL AGRICULTURE AND INDUSTRIAL EDUCATION

Two rating instruments, one for vocational agriculture and one for industrial education, were prepared to be used in rating material resources in the schools in the selected sample. The material resources were defined to include classroom, shop, and laboratory facilities, equipment, and teaching materials provided for instruction in the two programs included in the study. In addition, data were obtained regarding special resources, both material and non-material, which might be used to augment the effectiveness of operational procedures. Such special resources included counseling and testing services, provisions for school directed experience programs, and the use of community resources.

The Design of Instruments

The system of rating material resources developed for this study was directed primarily toward identifying potential variables which were likely to account for or be related to variations in the operations of programs of vocational agriculture and industrial education in the selected samples of schools. No attempt was made to catalog each specific piece of reference material or item of equipment. Rather, the system of rating resources essentially was an application of the observational interview technique (1) to determine value judgments of interviewee as to the adequacy, availability, and applicability of resources, and (2) to evaluate and adjust value judgments on the basis of observation of the physical resources. The two instruments were designed to serve as a guide to interviewing personnel rating resources in terms of adequacy or usage of resources, and, also, to be used as a check list in conducting the rating procedure.

The two instruments included a number of sections, each section devoted to a resource area. There are ten sections in the vocational form and nine sections in the industrial education form. The sections pertain to (1) adequacy of space, (2) library materials and teaching plans, (3) audio-visual aids, (4) tools and mechanical equipment, (5) laboratory facilities and equipment (for the vocational agriculture form only), (6) transportation, (7) guidance services, (8) resources for practical experience, (9) student organization and activities, and (10) community resources.

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[18] See infra, pp. A - 69 to A - 91.

Each section was sub-divided into appropriate sub-sections. Adequacy of space, for example, was sub-divided into adequacy of space for classroom, laboratory, and shop. The section for library materials and teaching plans was sub-divided into books, bulletins and similar materials, newspapers and periodicals, and teaching outlines.

Provisions were made on the form to rate the adequacy or, in some instances, the usage of the resources for pertinent areas for each sub-section. Provisions were made on the form to rate space for classroom, laboratory, and shop, for instance, for such items as area, space utilization, location and environment. For some sections, viz. library materials and teaching aids, the instruments were designed to get ratings for each of the separate sub-sections for subject matter areas such as occupational information, crop and livestock production, and health and safety.

The forms provided for a rating of adequacy for the first seven sections listed above. A four point scale was provided for the rating procedure. A rating of "1" indicated that the resource was not available. Ratings of "2", "3", and "4" signified that the resources for the particular area were considered inadequate, adequate, or very adequate, respectively.

For the last three sections listed above -- resources for practical experience, student organizations and activities, and community -- provisions were made to rate the extent to which the resource items were used in the instructional program. Again a four point scale was provided. A rating of "1" indicated that the resource item was not used. Ratings of "2", "3", and "4" were used to describe resource items which were used little, used considerably, or used extensively, respectively.

The two forms prepared to obtain ratings of resources were Vocational Agriculture: Appraisal of Resources (Form 7) and Industrial Education: Appraisal of Resources (Form 10); both forms are found in Appendix A.[19]

VI. THE PREPARATION OF SELF ANALYSIS INVENTORIES FOR TEACHERS OF VOCATIONAL AGRICULTURE AND INDUSTRIAL EDUCATION

Two self analysis inventories were prepared to be used in collecting data from vocational agriculture teachers and industrial education teachers pertaining to such variables as experience, education, and opinions of adequacy in selected professional and technical areas, and teaching load. The data collected were used in the analysis

[19] See infra, pp. A - 27ff. (Form 7) and A - 50ff. (Form 10).

of variations of purpose and operation scores.

The Design of the Instruments

The self analysis inventories were designed to obtain information regarding teaching assignment, educational training subject areas in which advanced training was pursued, expersence -- both in teaching and non-teaching positions, opinion estimates of training and experience adequacies, special assignment, transportation budget, and weekly teaching assignment. Provisions were made for the cooperating teacher to complete the form either by checking one of several responses for each item, or by writing in brief descriptive statements.

The two self analysis inventories were Vocational Agriculture Teacher Self Analysis Inventory (Form 3) and Industrial Education Teacher Self Analysis Inventory (Form 4), both of which are included in Appendix A.[20]

VII. THE PREPARATION OF THE GENERAL INFORMATION SURVEY

One instrument was prepared to be used to obtain data pertaining to school and community variables which potentially were related to variations in the extent to which schools were operating vocational agriculture and industrial education programs which manifested contemporary conditions and trends. The variables for which data were desired included type of organization, enrollment, and assessed valuation per cnrolled pupil.

The Design of the Instrument

The General Information Survey (Form 2) was designed to be filled out by high school principals in the participating schools. Provisions were made for information to be supplied by checking one of several response categories for each of eleven variables. The items were school organization, enrollment, membership in North Central Association of Colleges and Secondary Schools, rural-urban classification of the student body, length of school term, supervisory assistance in vocational education, guidance and counseling services available, adequacy of budget allocations, type and number of curricula in the high school, number of vocational agriculture and/or industrial education teachers in the school, and financial data. Form 2 is also included in Appendix A.[21]

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[20] See infra, pp. A - 5 to A - 12

[21] See infra, pp. A - 1ff.

VIII. THE PROCEDURES USED IN COLLECTING DATA

Section VIII describes the procedures used in collecting data for the study.

Collecting Data from Schools in the Samples

Appraisal of purposes. After the administrative offices of a specific school had agreed to participate in the study, a copy of Form 5 (Vocational Agriculture: Appraisal of Purposes) and/or a copy of Form 8 (Industrial Education: Appraisal of Purposes) were mailed to the high school principal. The principal was sent one or two forms, depending on whether the school offered one or both programs included in the study. The instruction requested the principal, teachers, and the vocational director in the appropriate program to rate cooperatively each purpose in terms of the extent to which the purpose was accepted as a goal in the school's vocational program. The ratings were to be accomplished prior to the visit to the school by one or more members of the research staff, and the forms were received by the representatives of the research staff at the time of the school visit.

Appraisal of operational levels. An appointment was scheduled with each high school principal for a visit to the school by one or more members of the research staff. During the visit, the observational interviews were conducted with members of the supervisory or teaching staff in the program offered by the school. Form 6 (Vocational Agriculture: Appraisal of Operational Levels), and Form 9 (Industrial Education: Appraisal of Operational Levels) were used as guides to the observational interviews. Ratings were made for each level for each purpose by one or two members of the research staff. Where two members of the staff participated in the interview, one member assumed major responsibility for the interview, but both members rated the operations independently. Subsequently, in these instances, a pooled rating was obtained for the teacher or supervisor.

Appraisal of resources. Following the observational interviews, during which ratings were obtained for operations, resources were inspected and ratings were obtained for physical resources. Form 7 (Vocational Agriculture: Appraisal of Resources) or Form 10 (Industrial Education: Appraisal of Resources) were used to get these ratings. Information was supplied both by teachers and also by vocational directors in schools where vocational directors were employed.

Self analysis inventories. Following each observational interview, a copy of either Form 3 (Vocational Agriculture Teacher: Self Analysis Inventory) or Form 4 (Industrial Education Teacher: Self Analysis Inventory) was given to the interviewee, together with a stamped, self-addressed envelope. The teacher was requested to accom-

plish the inventory and mail it to the project directors.

General information survey. A copy of Form 2 (General Information Survey) was mailed to the high school principal, with Forms 5 and 1 or 8. The principal was requested to accomplish Form 2 prior to the visit of members of the research staff. This form was collected by a member of the research staff when the school was visited.

Collecting Data from Members of Juries

Copies of Forms 11 (Rating of Purposes: Vocational Agriculture), 12 (Rating of Purposes: Industrial Education), 13 (Appraisal of Operational Levels: Vocational Agriculture), and 14 (Appraisal of Operational Levels: Industrial Education) were mailed to specialists in school administration, curriculum construction, and agricultural education or industrial education who agreed to serve as members of juries of specialists. The selection of the jury is detailed in Chapter III.

SUMMARY OF CHAPTER II

Chapter II actually was divided into three major parts. The first part, which included Sections I and II, presented the rationale by which the social data identified and analyzed in Part I of the study were translated to criteria for appraising programs of vocational education. A review of the results of Part I was given in Section II, culminating in a restatement of the contemporary design for vocational education. The design included ten characteristics of socially adapted programs of vocational education.

The second part of Chapter II included Sections III, IV, V, VI, and VII, which described the preparation of thirteen instruments used to collect data for Part II of the study. Using the contemporary design for vocational education as a point of departure, a list of twenty-five purposes of vocational agriculture, and a list of twenty-three purposes of industrial education were prepared to serve as the basic framework for the appraisal process. These two lists of purposes were used to construct four forms which were employed in the appraisal of purposes. Then four forms were constructed for use in appraising the operational emphasis and effort which was being put forth to attain each purpose. Lastly, five forms were constructed to collect data regarding material and human resources available for operating the programs, and school and community data which were potential variables related to the effective operation of the programs.

The third part of the chapter included Section VIII, which described the procedures employed to collect the data for the study.

CHAPTER III

THE SELECTION OF SAMPLES

Chapter III describes the sampling procedures used in the study. In the first section of this chapter, the sampling procedures applied to select a sample of schools offering vocational agriculture and a sample of schools offering industrial education are reported. The second section discusses the sampling procedures used to select potential members of four juries of educational specialists.[1]

I. THE SELECTION OF SCHOOLS FOR THE SAMPLE

The original proposal submitted to the Cooperative Research Branch of the United States Office of Education provided that a sample of 75 Indiana high schools, or approximately 15 per cent of the schools offering vocational agriculture and/or industrial education programs, would be selected for Part II of the study.[2] In conducting the study, however, a decision was made to select a sample which would facilitate the testing of three hypotheses pertaining to size of school, type of program offerings, and, in the case of industrial education, nature of programs. In addition, a decision was made to stratify the sample to insure maximum dispersion of the schools within the state.

The three hypotheses were stated as follows:

1. Operational scores[3] and operational aggregates[4] for

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[1] Chapter III deals with the attainment of the two objectives listed in Chapter I, supra, p. 3.

(2.) To select an adequate sample of schools offering programs of vocational agriculture and/or industrial education in Indiana public high schools.

(3.) To select juries of educational specialists to appraise the relative importance of purposes of vocational agriculture and industrial education, and to appraise the educational values of levels of operation for vocational agriculture and industrial education.

[2] F.J. Woerdehoff, N.J. Nelson, and J.K. Coster, "Vocational Education in Public Schools as Related to Social, Economic, and Technical Trends," mimeographed proposal, Division of Education, Purdue University, Lafayette, Indiana; February, 1958.

[3] The term, "operational scores", is discussed in Chapter V,

programs of vocational agriculture and industrial education are independent of the size of the high school.

2. Operational scores and operational aggregates for programs of vocational agriculture and industrial education are independent of the variable of whether schools offer both vocational agriculture and industrial education programs or only one of these programs.

3. Operational scores and operational aggregates for industrial education programs are independent of the variable of whether schools were offering industrial arts only or trade and industrial education programs in addition to industrial arts.

Explanation of Stratification Procedures

For purposes of this study it was determined that specific consideration needed to be given to school size, type of program offerings, geographic location, and nature of program offerings in the field of industrial education. Thus, these factors served as a basis for stratification in the sampling procedures used in the study.

Size of school. To select a sample of schools which would serve to test hypotheses involving school size, it was decided that schools should be stratified into three discrete size groups as follows: (1) a small-size group which included high schools enrolling 100 to 150 students, (2) a middle-size group which included high schools enrolling 300 to 450 students, and (3) a large-size group which included high schools enrolling 600 or more students. This decision was based on the point of view that discrete school size groups, separated by appropriate intervals, represented somewhat more unique and differentiated groups than groups that might have been selected from the total population without stratification.

Type of program offerings. A common practice in many Indiana high schools, especially in small high schools, is to offer either programs of vocational agriculture or industrial education as the major practical arts field of study available to high school boys. A number of schools, however, offer both programs, regardless of size. To be able to test hypotheses to the effect that operational scores and operational aggregates are independent of the type of program offerings, it was determined that the appropriate stratification procedure would

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for vocational agriculture, and Chapter XI for industrial education.

[4] The term, "operational aggregate", is discussed in Chapter VI, for vocational agriculture, and Chapter XII, for industrial education.

be employed to assure the selection of a sample of schools which would yield the necessary number in the various categories needed for performing statistical tests.

Nature of programs in industrial education. The study was directed toward an appraisal of vocational programs in agricultural and industrial education. A decision was made to include schools offering industrial arts programs, which generally are not considered a part of vocational education, in the sample of industrial education program schools. This decision was based on the following four reasons: (1) Not a single small school and only four middle-size schools were offering programs in trade and industrial education during the 1958-1959 school year. (2) Many school systems consider industrial arts as a form of vocational education despite the general education emphasis often associated with these programs. (3) Both industrial arts programs and trade and industrial education programs, as generally conceived, contribute to the attainment of the purposes of industrial education formulated in the light of the contemporary design for vocational education.[5] (4) Many industrial arts programs in operation in Indiana high schools during the 1958-1959 school year were operated similarly to day-unit trade and industrial education programs with the notable exception that less than three hours of instruction per pupil per day was being offered.

It should be pointed out and emphasized that the inclusion of industrial arts programs in the present study represents by no means an attempt to appraise these programs in terms of the generally accepted objectives associated with industrial arts programs. Rather, the intent here is (1) to ascertain the extent to which schools whose industrial education programs are limited to industrial arts courses are offering a vocationally oriented program based on the purposes developed in light of the contemporary design for vocational education, and (2) to compare schools which offer industrial arts only with schools which offer both industrial arts and trade and industrial education programs.

Stratification according to geographical location. In order to assure maximum dispersion of the schools throughout the state, schools were stratified according to geographical location, in addition to size and program offerings. The state was divided into four sections: (1) the north section, (2) the north central section, (3) the south central section, and (4) the south section. These divisions were made since the state varies greater from north to south boundaries than from east to west boundaries. Northern Indiana is highly industrialized, Central Indiana includes the rich

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[5] See supra, pp. 24-25 and 29-31.

agricultural corn belt area, and Southern Indiana is characterized by an undulating topography with relatively few industrial centers.[6]

The Selection of the Preliminary Sample

In light of the stratification procedures discussed in the preceding sub-section, the population of schools meeting the necessary stratifying conditions were identified.

The identification of size-program offering categories. According to data supplied by the Indiana State Department of Public Instruction, a total of 245 schools in the three size groups selected for study offered programs of vocational agriculture and/or industrial education during the 1957-1958 school year.[7] The number of schools in each size group offering either programs of vocational agriculture or industrial education, and schools offering both programs, is shown in Table III-1.

If a sample of 75 schools were desired, which represent 30.6 per cent of the 245 schools in the universe, then a straight proportional sampling would have resulted in a very small number of schools in certain categories and a relatively large number of schools in other categories. For example, there would have been only 16 x .306, or five schools in the large-size group offering both vocational agriculture and industrial education programs, and 68 x .306, or 21 schools in the small-size group offering vocational agriculture programs only. In addition, since there were only 31 large schools and four middle-size schools offering trade and industrial education programs, there was a good chance that not more than ten schools offering trade and industrial education programs would be selected on a random basis.

Hence, the possibility of drawing a random sample based on the proportion of the size of the sample to the size of the universe was rejected. Instead a decision was made to select a sample of 84 schools as follows:

1. Ten small schools offering vocational agriculture only.

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[6] The pattern of geographical distribution, based on the proportion of schools in each size-program offering category in each section, for the 84 school sample, is shown in Table III-3, infra, p. 50.

[7] Indiana School Directory for the School Year 1957-58. Indianapolis, Indiana: Indiana State Department of Public Instruction, 1957. Comparable data for the 1958-59 school year were not available when the sample was drawn.

TABLE III-1

THE NUMBER OF INDIANA HIGH SCHOOLS IN THE UNIVERSE, GROUPED ACCORDING TO THREE DISTINCT SIZE CATEGORIES AND PROGRAM OFFERINGS IN AGRICULTURAL AND INDUSTRIAL EDUCATION

Type of program	Size Group			
	Small	Medium	Large	Total
Vocational agriculture only	68	3	0	71
Industrial education only	30	21	56	107
Both vocational agriculture and industrial education	19	32	16	67
Total	117	56	72	245

2. Ten small schools offering industrial arts only.

3. Ten small schools offering both vocational agriculture and industrial arts.

4. Ten middle-size schools offering industrial arts only.

5. Ten middle-size schools offering both vocational agriculture and industrial arts.

6. Four (all) middle-size schools offering trade and industrial education plus industrial arts.

7. Ten large schools offering industrial arts only.

8. Ten large schools offering trade and industrial education plus industrial arts.

9. Ten large schools offering both programs of vocational agriculture and industrial education--either industrial arts only or both industrial arts and trade and industrial education.

The number and per cent of schools in each sub-group sample, arranged according to school size and program offering stratifications, are shown in Table III-2. The sample proportions ranged from 15 per cent, for the small schools offering vocational agriculture only to

100 per cent for the middle-size schools offering trade and industrial education programs.

The pattern of geographical distribution is shown in Table III-3. This table shows that the vocational agriculture programs were fairly evenly distributed among the four geographical sections, but that the industrial education programs were unevenly distributed in the state, with a larger proportion occurring in the North and South Central sections than in the North Central and South sections.

The Selection of the Final Sample

The schools in the population were listed alphabetically by name of school district and name of county and properly stratified according to geographic location, size of school, and program offerings. The schools were appropriately numbered and a table of random numbers was used to select the schools to be included in the sample. At the same time, alternates were selected to be used in the event certain schools did not qualify or did not elect to participate in the study. To assure further the maximum dispersion of schools, arbitrarily, it was decided to include not more than one school in each size-program offering category for each school corporation, and not more than two schools in each size-program offering category from each county.

A letter was mailed to the high school principal of each school in the sample to invite the principal to participate in the study.[8] A carbon copy of the letter was mailed to the superintendent of schools. Of the original group of eighty-four principals contacted, sixty-six agreed to participate in the study, eleven did not agree to participate, and seven did not reply to the letter. Letters then were written to principals of alternate schools. Altogether, 110 principals were contacted, of whom eighty-six agreed to participate, thirteen did not agree to participate, and eleven did not reply to either the original or a follow-up letter. The eighty-six principals who agreed to participate included two principals who were in the original sample, but who responded after the alternates were selected. Subsequently, one principal requested that his school be dropped from the sample, making a total of fourteen principals who did not agree to participate. The final sample, therefore, included eighty-five schools, of which forty-one offered voational agriculture, and seventy-five offered industrial education. The industrial education schools included fifty-six schools offering industrial arts only, and nineteen schools offering trade and industrial education programs in addition to industrial arts. The nineteen trade and industrial education schools included the four middle-size and the ten large size schools in which both

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[8] A copy of the letter is included in the report in Appendix B.

TABLE III - 2

THE NUMBER AND PERCENT OF THE TOTAL UNIVERSE OF INDIANA HIGH SCHOOLS GROUPED ACCORDING TO THREE DISTINCT SIZE CATEGORIES AND OFFERINGS IN VOCATIONAL AGRICULTURE AND INDUSTRIAL EDUCATION INCLUDED IN THE SAMPLE

Type of program	Size Group: Small N	Small %	Medium N	Medium %	Large N	Large %	Total
Vocational agriculture only	10	15	0	0	0	0	10
Industrial education only							
a. Industrial arts only	10	33	10	55	10	30	30
b. Trade and industrial education	0	0	4	100	10	43	14
Both vocational agriculture and industrial education	10	53	10	30	10	71	30
Total	30		24		30		84

TABLE III - 3

THE PATTERN OF GEOGRAPHICAL DISTRIBUTION OF INDIANA HIGH SCHOOL INCLUDED IN THE SAMPLE

Universe	Geographic Location				
	North	North central	South central	South	Total
Vocational agriculture only					
a. Small	2	3	3	2	10
b. Medium	0	0	0	0	0
c. Large	0	0	0	0	0
Industrial arts only					
a. Small	3	1	4	2	10
b. Medium	3	3	3	1	10
c. Large	7	1	1	1	10
Trade and industrial education					
a. Small	0	0	0	0	0
b. Medium	1	0	1	2	4
c. Large	4	3	2	1	10
Both vocational agriculture and industrial education					
a. Small	3	3	3	1	10
b. Medium	2	3	3	2	10
c. Large	3	1	3	3	10
Total	28	18	23	15	84
Schools offering vocational agriculture	10	10	12	8	40
Schools offering industrial education	26	15	20	13	74

industrial arts and trade and industrial education programs were offered, plus five large schools that offered vocational agriculture, industrial arts, and trade and industrial education programs.)

Data pertaining to the reaction of principals in the 110 schools relative to participation in the sample are shown in Table III-4. This table notes (1) the number of principals of schools in each size-program offering category contacted, (2) the number of principals who agreed to participate in the study, (3) the number who did not agree to participate, and (4) the number who did not reply to the letter. Table III-4 shows that there were only eight schools in the large size group offering both vocational agriculture and industrial education in the final sample, instead of ten schools originally selected. During visits to the schools, errors in reporting enrollments were discovered. One school originally listed as a large school subsequently was placed in the middle size group, and one was placed in the small size group.

Summary

The first section of Chapter III is devoted to describing the procedures used to select 85 Indiana public high schools for the study. The 85 schools included a sample of 41 high schools offering vocational agriculture programs, and 75 high schools offering industrial education programs. The samples were stratified according to size of school, program offerings, nature of industrial education programs (in the industrial education sample) and geographical section, and randomized on all other variables.

II. THE SELECTION OF JURIES OF EDUCATIONAL SPECIALISTS

To rate the importance of twenty-five purposes of vocational agriculture and twenty-three purposes of industrial education, and to appraise the relative educational value of operational levels for twenty-five purposes of vocational agriculture and twenty-three purposes of industrial education, four juries of educational specialists were selected, as follows:

I. A jury, including specialists in school administration, curriculum construction, and agricultural education, to rate purposes of vocational agriculture.

II. A jury, including specialists in school administration, curriculum construction, and industrial education, to rate purposes of industrial education.

TABLE III - 4

DATA PERTAINING TO REACTION OF SCHOOLS IN THE SAMPLE RELATIVE TO PARTICIPATION IN THE STUDY

Universe	Number of schools contacted	Agreed to participate	Did not agree to participate	Did not answer
Vocational agriculture only				
a. Small	13	10	0	3
b. Medium	0	0	0	0
c. Large	0	0	0	0
Industrial education				
Industrial arts only				
a. Small	13	10	3	0
b. Medium	15	10	3	2
c. Large	16	10	3	3
Trade and industrial education				
a. Small	0	0	0	0
b. Medium	4	4	0	0
c. Large	11	10	0	1
Both vocational agriculture and industrial education				
a. Small	15	11	2	2
b. Medium	14	12	2	0
c. Large	9	8	1	0
Total	110	85	14	11

III. A jury, including specialists in school administration, curriculum construction, and agricultural education, to rate educational value of operational levels for twenty-five purposes of vocational agriculture.

IV. A jury, including specialists in school administration, curriculum construction, and industrial education, to rate the educational value of levels of operation for twenty-three purposes of industrial education.

The selection and use of juries which included specialists in three areas of education represents a manifestation of one of the basic assumptions of the bidimensional approach to educational appraisal, which has been elaborated elsewhere.[9] The problem of translating social reality into edcational programs is one which educators with diverse frames of references, points of view, educational backgrounds, and philosophies are involved. In actual practice, educators are likely to interpret social data in terms of their own special area of interest, position of employment, or background and experience. In the instance of the present study, the juries were asked to rate the relative importance of purposes of either agricultural education or industrial education and the relative educational value of levels of operation in light of findings of Part I of the study which dealt with the identification of trends related to vocational education. Interpretation of the social data which emerged from Part I of the study, therefore, in essence represents an expression of value judgments as to the relative importance that can be attached to the social data as subsequently translated into educational programs in either agricultural education or industrial education.

In order that the ratings and scores assigned to purposes and levels of operation might approximate as nearly as possible educational reality in actual existance, the design of the study called for the use of three diverse groups of specialists. A sub-jury of administration specialists was included in each of the four juries on the assumption that these specialists would tend to view the translation of trend data into educational reality from the point of view of the individuals who are responsible for the total development of educational programs in the public schools. The school administration specialists, it was believed, were the group more likely to question the economic feasibility of an instructional program and instructional techniques, and the cost and time involved in assaying the relative educational value of purposes and levels of operation, than other groups of

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[9] J. K. Coster, N. J. Nelson, and F. J. Woerdehoff, A Bidimensional Approach to Educational Appraisal (Lafayette, Indiana: Purdue University, Division of Education), 1960.

educational specialists. A sub-jury of curriculum specialists was included in each of the four juries on the assumption that these specialists would view the translation of trend data into educational reality from the frame of reference of persons constantly concerned with interpreting the broad needs and goals of society in terms of curriculum content and educational methodology. A sub-jury of vocational educators was included in each jury on the assumption that these specialists are charged with the responsibility of developing educational programs designed to prepare persons for occupational proficiency in a constantly changing society. The combined ratings of the three juries, it was believed, would manifest in the rating the realism of the school administration specialists, the educational idealism of the curriculum specialists, and the specific knowledge of vocational programs of the vocational education specialists.

The Selection of Juries of Specialists

Sources of potential jury members. In each instance, the three sub-juries for the four juries of specialists were selected from membership lists in nationally recognized organizations of specialists in the three fields. Administration specialists to rate purposes and operational levels in vocational agriculture were selected from membership in the Rural Division of the National Education Association. Administration specialists to rate purposes and operational levels of industrial education were selected from membership in the American Association of School Administrators. All curriculum construction specialists were selected from membership in the Association of Supervision and Curriculum Development of the National Education Association. Specialists in agricultural education were selected from a directory issued by the Agricultural Education Branch of the United States Office of Education, and included college personnel working in agriculture education, but excluded head teacher trainers in agricultural education. Head teacher trainers in agricultural education in the several colleges and universities preparing persons for teachers for vocational agriculture were excluded in that they previously had been included in the jury to rate the relevance of trends to vocational education as Part I of the current project. Specialists in industrial education were also selected from a directory issued by the Trade Industrial Education Branch of the United States Office of Education and included persons employed on trade and industrial education staffs in colleges and universities, but also excluded head teacher trainers in trade and industrial education.

The selection of specific jury members. Potential jury members were selected, using random procedures, as follows:

A list of 150 names from the membership lists in the Rural Education Division in the National Education Association was drawn

randomly, and this list was divided, by lot, into two groups of 75 names each. One group was assigned, by lot, to Potential Jury I to rate purposes of vocational agriculture. The second group was assigned, by lot, to Potential Jury III to rate operational levels of vocational agriculture.

A list of 150 names was drawn randomly from membership lists in the American Association of School Administrators. The list of names was divided, by lot, into two separate list of seventy-five names each. One group was assigned, by lot, to Potential Jury II, to rate purposes of industrial education. The second group was assigned to Potential Jury IV to rate operational levels of industrial education.

A list of 348 names was drawn randomly from membership lists in the Association for Supervision and Curriculum Development of the National Education Association. In selecting the list of 348 names, however, persons whose title would suggest that they were employed in elementary education or in a special field of supervision or curriculum development, such as music or art, were excluded from the potential jury. Insofar as possible, therefore, the potential jury members included persons employed in or engaged in supervision or curriculum development, either as college teachers or as supervisors of instruction or directors of curriculum in secondary schools, whose speciality, basically, was the secondary school curriculum. The list of 348 names was divided, by lot, into four groups, with 87 names in each group. The groups were assigned to Potential Juries I, II, III, and IV to rate purposes of vocational agriculture, purposes of industrial education, operational levels of vocational agriculture, and operational levels of industrial education, respectively.

A list of 100 names of teacher trainers in agricultural education, excluding head teacher trainers, was drawn randomly from a directory issued by the Agricultural Education Branch of the United States Office of Education. This list was divided, by lot, into two groups of 50 names each. One group was assigned to Potential Jury I, to rate purposes of vocational agriculture, and the other group was assigned to Potential Jury III to rate operational levels of vocational agriculture.

The 94 teacher trainers in industrial education, who were no head teacher trainers, listed in a directory supplied by the Trade and Industrial Education Branch of the United States Office of Education, was divided by lot into two groups of 47 names each. One group was assigned to Potential Jury II to rate purposes of industrial education, and the other group was assigned to Potential Jury IV to rate operational levels of industrial education.

Letters were written to potential jury members, inviting them

to participate in the research as a member of a specified jury.[10] A brief description of the project was enclosed with the letter.[11] Of the 842 persons contacted, 690, or 82 per cent, agreed to serve on a jury. A copy of the appropriate instrument described in Chapter II,[12] and a copy of an abstract of Part I of this study[13] were mailed to each person who agreed to participate.

The composition of the juries. The four juries used in the study included the potential jury members who agreed to serve on a jury, and who returned complete and usable instruments prior to initiation of statistical analyses. The composition of the four juries was as follows:

Jury I, that rated purposes of vocational agriculture, included 104 specialists, of whom 32 were in school administration, 33 in curriculum construction, and 39 in agricultural education.

Jury II, that rated purposes of industrial education, included 84 specialists, of whom 20 were in school administration, 35 in curriculum construction, and 29 in industrial education.

Jury III, that rated operational levels of vocational agriculture, included 55 specialists, of whom 12 were in school administration, 24 in curriculum construction, and 19 in agricultural education.

Jury IV, that rated operational levels of industrial education, included 50 specialists, of whom 13 were in school administration, 18 in curriculum construction, and 19 in industrial education.

In interpreting results of ratings applied by jury members, it should be pointed out and emphasized that although a random technique was used in selecting potential jury members, generalizations were not drawn beyond the limits of the jury members who actually participated in the study. Rather, the results of ratings of juries, presented in Chapters IV, V, X, and XI are results based on juries of 104, 85, 55, and 50 specialists respectively, the members of which

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[10] A copy of the letter is included in this report as Appendix B.

[11] A copy of the description is included as Appendix C.

[12] See supra, pp. 31 and 35-37.

[13] F. J. Woerdehoff, N. J. Nelson, and J. K. Coster, An Abstract of the Analysis of Social, Economic, and Technical Trends and Concepts Related to Vocational Education (Studies in Education No. 3 , Lafayette, Indiana: Purdue University, Division of Education), 1959.

(1) were believed to be competent to express judgments regarding the importance of purposes or educational value of levels of operation, (2) agreed to participate in the study, and (3) were interested in the study to the extent that completed instruments were returned in time for statistical analyses.

Summary

The second section of Chapter III is devoted to discussing the selection of four juries of educational specialists, including specialists in school administration, curriculum construction, and agricultural education or industrial education. The four juries selected were as follows:

Jury I, composed of 104 specialists, to rate the importance of 25 purposes of vocational agriculture.

Jury II, composed of 84 specialists, to rate the importance of 23 purposes of industrial education.

Jury III, composed of 55 specialists, to rate the educational value of levels of operation for 25 purposes of vocational agriculture.

Jury IV, composed of 50 specialists, to rate the educational value of levels of operation for 23 purposes of industrial education.

SUMMARY OF CHAPTER III

Chapter II was divided into two major parts. The first part, Section I, described the procedures used to select 85 schools for the study including a sample of 41 programs of vocational agriculture and 75 programs of industrial education. The samples were stratified according to (1) size of school, (2) whether schools offered either vocational agriculture or industrial education programs only, or both vocational agriculture and industrial education programs, and (3) for the industrial education sample, whether schools offered industrial arts only or trade and industrial education programs with industrial arts. These stratifications were used to facilitate the testing of hypotheses pertaining to variables which, at the outset, were predicted to be related significantly to variations in operational scores and/or operational aggregates. In addition, the schools in the sample were stratified according to geographical location of the schools in the state of Indiana.

The second part, Section II, described the procedures used to select four juries of educational specialists to rate (1) the importance of purposes of vocational agriculture, (2) the impor-

tance of purposes of industrial education, (3) the educational value of levels of operation for vocational agriculture, and (4) the educational value of levels of operation for industrial education. The juries included specialists in school administration, curriculum construction, and agricultural education or industrial education. Potential jury members were selected randomly from available lists of specialists in the four fields. The four juries to which references are made in subsequent chapters actually are persons from the potential jury members who agreed to participate in the study, and who returned completed instruments in time to be used in statistical analyses.

CHAPTER IV

THE ANALYSIS OF PURPOSES OF VOCATIONAL AGRICULTURE

Chapter IV reports the results of a quantitative analysis of qualitative value judgments expressed by members of Jury I[1] with regard to the relative importance of the twenty-five purposes of vocational agriculture. In addition, comparisons are made between the relative importance of purposes, as expressed by value judgments of jury members, and ratings assigned to purposes by schools, in terms of the extent to which each purpose is accepted as a goal of the school's vocational agriculture program.[2]

I. THE DERIVATION OF PURPOSE SCORES

The basic procedural problem to be elaborated upon in Chapter IV was the assignation of a score to each of twenty-five purposes of vocational agriculture. The problem basically was one of quantifying qualitative data. The desired outcomes resulting from quantifications and statistical analyses applied to value judgment data were (1) a quantitative hierarchy indicative of the order of importance of the twenty-five purpose items, and (2) a set of purpose scores amenable to statistical treatment.

The report on assigning scores to purpose items is divided into two parts, the first dealing with analyses of data made to ascertain the efficacy of the scoring procedure, and the second pertaining to tests of significance applied to determine extent of agreement among the three sub-juries.

[1] See supra, p. 56

[2] Specific objectives listed in Chapter I (supra, p. 3) which are treated in the present chapter include:

(4.) To determine the relative importance of each of a list of twenty-five purposes of vocational agriculture, as appraised in light of a list of social, economic, and technical trends which have been ranked in order of the extent to which the trends should be considered in planning future programs of vocational agriculture.

(5.) To ascertain the extent of agreement between scores assigned to purpose items by schools, based on acceptance of purposes as goals in vocational agriculture programs, and scores assigned to purposes by jury members, based on judgments as to relative importance of purposes.

The Efficacy of the Scoring Procedure

The data. The data used in deriving purpose scores were the ratings of the 104 educational specialists who comprised Jury I applied to Form 11 (Rating of Purposes: Vocational Agriculture).[3]

The derivation and analysis of purpose scores. Quantitative scores were assigned to each of the twenty-five purposes of vocational agriculture by summing the ratings assigned to each item for all raters. Item scores, together with the frequency distribution of jury members checking each numerical response category on Form 11, are shown in Table IV-1. The purpose items listed in descending order of importance are listed in Table IV-2.

The reliability of the scores assigned to items was determined by an internal consistency procedure of estimating test reliability for unrestricted item scoring methods by analysis of variance.[4] For the data in Table IV-1, the sum of squares between items was calculated as 835.46, and, for 24 degrees of freedom, the mean square of items (MS_I) was 34.8108. The residual or error sum of squares was 5470.78, and with (104-1) (25-1) or 2472 degrees of freedom, the mean square (MS_E) was 2.2131. The reliability coefficient was determined by the formula:

$$r_{tt} = (MS_I - MS_E) / MS_I ,$$

which, in this instance was (34.8108 - 2.2131) / 34.8108, or .936.

A reliability coefficient of .936 is indicative that the ratio of error variance to variance which accrued from systematic ratings was minimal. The efficacy of the rating-scoring procedure is demonstrated further by applying an F test to the null hypothesis to the effect that random ratings were assigned by raters to items. Using the formula $F = MS_I / MS_E$, and substituting 34.8108 / 2.2131, the value of F was computed as 15.73. With 24 and 2472 degrees of freedom involved, the hypothesis was rejected,[5] actually at the .1 per cent level of significance. The results of these tests indicated that there was practically no possibility that random ratings were assigned to purpose items, but, rather, that systematic judgment was exercised in selecting numerical response categories.

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[3] Infra, pp. A-60 ff.

[4] C.J. Hoyt and C.L. Stunkard, "Estimation of Test Reliability for Unrestricted Item Scoring Methods," Educational and Psychological Measurement, 12: 756-8, Winter, 1952.

[5] The standard for rejecting a null hypothesis, used throughout this study, was set at the 5 per cent level of significance.

TABLE IV - 1

THE NUMBER OF JURY MEMBERS WHO CHECKED EACH NUMERICAL RESPONSE CATEGORY, AND THE TOTAL SCORE ASSIGNED TO EACH OF TWENTY-FIVE PURPOSES OF VOCATIONAL AGRICULTURE

Purpose number	Frequency of Jury Members Who Checked Each Response Category: Response categories 1	2	3	4	5	6	7	8	9	Purpose Scores	Purpose Ranks
1	0	2	8	4	25	8	20	14	23	676	19
2	0	2	2	2	9	9	29	18	33	761	7.5
3	1	1	7	3	8	9	21	21	33	742	12
4	0	0	1	0	4	8	21	20	50	828	1
5	1	1	1	6	13	5	31	13	33	743	11
6	0	0	0	5	8	13	28	23	27	761	7.5
7	1	0	4	5	17	10	27	18	22	709	14
8	1	1	7	2	8	9	18	23	35	751	9
9	0	4	9	4	14	15	21	17	20	674	20
10	0	1	5	5	18	12	24	20	19	698	16
11	0	1	1	2	4	14	25	22	35	783	4
12	0	1	1	3	25	12	28	21	13	695	17
13	1	0	1	2	7	10	24	21	38	785	3
14	3	2	9	2	17	17	27	16	11	645	24
15	1	0	8	3	18	19	28	13	14	667	22
16	2	9	14	6	18	24	17	8	6	557	25
17	2	2	6	7	12	10	28	16	21	685	18
18	0	2	5	5	15	15	21	17	24	703	15
19	3	0	5	5	13	8	21	14	35	725	13
20	1	0	3	3	5	8	18	25	41	790	2
21	3	1	6	8	21	11	25	14	15	648	23
22	1	1	2	0	14	11	24	27	24	745	10
23	2	0	2	2	6	9	21	24	38	781	5
24	5	2	9	3	14	11	17	18	25	672	21
25	1	0	3	2	9	7	21	25	36	776	6

TABLE IV - 2

A LIST OF TWENTY-FIVE PURPOSES OF VOCATIONAL AGRICULTURE RANKED IN ORDER OF DESCENDING PURPOSE SCORES

Rank	Purpose Number	Score	Item
1	4	828	To assist students in developing the ability to organize and apply technical agricultural knowledge and information to the solution of farm problems.
2	20	790	To assist students in developing abilities to organize land, labor, and capital resources into an efficient producing unit.
3	13	785	To assist persons in critically analyzing the economic requirements essential for establishing and maintaining efficient farming units.
4	11	783	To assist students in developing abilities to understand marketing processes and to market products and services profitably.
5	23	781	To assist persons established in farming in adjusting to changing occupational conditions in farming.
6	25	776	To assist students in developing an understanding of scientific knowledge, concepts, and methods related to agriculture.
7.5	2	761	To assist students in developing an appreciation for and an understanding of technological developments in agriculture.

TABLE IV - 2 (continued)

Rank	Purpose Number	Score	Item
7.5	6	761	To assist students in developing abilities essential to maintaining healthful and safe conditions on the farm and in the home.
9	8	751	To assist students in developing abilities essential for assuming leadership and citizenship roles.
10	22	745	To assist students in developing abilities to procure and utilize efficiently equipment, supplies, and services.
11	5	743	To assist students in developing abilities to maintain, operate, and adjust farm power, machinery, and equipment.
12	3	742	To assist students in developing traits, such as cooperation, industry, and initiative, essential for successful occupational adjustment and human relations.
13	19	725	To assist out-of-school youth and adults enter into and/or become more effectively established in farming.
14	7	709	To assist persons in exploring the redirection of agricultural patterns, practices, and concepts.
15	18	703	To assist students in developing an appreciation for the place of agriculture in the emerging pattern of American society.
16	10	698	To assist students in developing mechanical skills, such as carpentry, welding, and cold metal work, involved in farm improvement and maintenance.

TABLE IV - 2 (continued)

Rank	Purpose Number	Score	Item
17	12	695	To assist students in developing non-mechanical (i.e., manipulative and identification) skills, such as pruning fruit trees, identifying weed seeds, culling hens, involved in farm production and improvement.
18	17	685	To assist high school students in formulating realistic occupational goals.
19	1	676	To assist students in developing an appreciation of the economic contributions of agriculture to society.
20	9	674	To assist persons in understanding and interpreting the role of agriculture in society.
21	24	672	To assist academically talented students in preparing for education beyond the high school level.
22	15	667	To assist students in exploring the possibilities of employment in agricultural occupations.
23	21	648	To assist high school students in obtaining employment in appropriate agricultural occupations.
24	14	645	To assist out-of-school youth and adults enter into and/or become more effectively established in farm related occupations.
25	16	557	To assist persons in developing interests and abilities of an avocational nature (e.g., aesthetic appreciations and leisure time activities, such as landscaping, gardening, and establishing lawns), related to agriculture.

To determine the extent to which confidence may be placed on the rank order of purpose items, as shown in Table IV-2, the least significant difference between any two item totals (i.e., purpose scores) was calculated. The estimate of the variance of any one total is N (MS_E), or 104 x 2.2131, or 230.1624, and the estimate of variance of the difference between any two totals is (2) (N) (MS_E), or 460.3248. The standard error of the difference between any two totals, therefore, is 21.4552. The least significant difference between any two totals, at the 5 per cent level of significance, is 1.96, the critical value of t, times 21.4552, the standard error, or 42.05.

Inspection of the scores shown in Table IV-2 reveals the points where purpose scores differed significantly. At the 5 per cent level of significance, Purpose No. 4, ranked first, did not score significantly higher than Purpose No. 20, ranked second. But, Purpose No. 4 did score significantly higher than purposes ranked third or lower. The score of the lowest ranking purpose, Purpose No. 16, was significantly lower than any of the other purposes.

The results of the foregoing analyses confirmed the adequacy of the scaling procedures. Not only was the reliability of the scale found to be extremely high, but, of equal importance, evidence was obtained which indicated that the jury members attacked the problem of assigning scores to items systematically. Moreover, the scores assigned to individual purpose items varied to such extent that there was little or no likelihood that jury members regarded the purpose items as equal in importance.

Evidence of Agreement Among Sub-Juries

Analyses were made of scores and ranks of scores to ascertain variations between and among sub-juries. Correlation coefficients were computed of scores and ranks of scores between specialists in school administration and curriculum construction, between specialists in curriculum construction and agricultural education and between specialists in school administration and agricultural education. Then a series of twenty-five null hypotheses were set up and tested to the effect that there were no variations among the three sub-juries as to mean scores assigned to individual items.

Table IV-3 shows the scores assigned to purpose items summed separately for each of the three sub-juries and for the total sample. Ranks for each sub-jury and the total sample are also indicated. Rank order correlation coefficients of .65, .49, and .70 were obtained between ranks assigned by administration and curriculum sub-juries, between ranks assigned by curriculum and agricultural education sub-juries, and between ranks assigned by administration and agricultural education sub-juries, respectively. Product moment correlation coefficients of .65, .48, and .73 were obtained respectively between scores assigned by administrator and curriculum sub-juries, and between scores assigned by administration and agricultural education sub-juries.

TABLE IV - 3

SCORES AND RANKS ASSIGNED TO TWENTY-FIVE PURPOSES OF VOCATIONAL AGRICULTURE BY THREE SUB-JURIES OF EDUCATIONAL SPECIALISTS AND TOTAL JURY, SHOWING CORRELATION

Purpose			Sub-Juries of Educational Specialists					
			School administration		Curriculum construction		Agriculture education	
Rank	Score	Number	Rank	Score	Rank	Score	Rank	Score
1	828	4	1	244	2	245	1	339
2	790	20	10	221	5	239	3	330
3	785	13	4	229	11.5	228	4	328
4	783	11	8	224	8.5	233	5	326
5	781	23	11	220	3	241	6	320
6	776	25	2	243	1	247	13	286
7.5	761	2	3	233	4	240	12	288
7.5	761	6	6	225	7	234	9	302
9	751	8	5	227	13	225	10	299
10	745	22	13	212	11.5	228	8	305
11	743	5	8	224	20	205	7	314
12	742	3	12	213	6	236	11	293
13	725	19	18	202	24	189	2	334
14	709	7	17	206	8.5	233	16	270
15	703	18	14.5	209	10	230	18	264
16	698	10	8	224	22.5	191	14	283
17	695	12	16	208	17	212	15	275
18	685	17	21.5	196	15.5	221	17	268
19	676	1	19.5	199	14	224	24	253
20	674	9	14.5	209	18.5	210	22.5	255
21	672	24	24	189	15.5	221	19	262
22	667	15	21.5	196	18.5	210	20	261
23	648	21	19.5	199	22.5	191	21	258
24	645	14	23	190	21	200	22.5	255
25	557	16	25	170	25	181	25	206

	Correlation coefficients	
	Rank order	Product moment
School administration - Curriculum construction	.65	.65
Curriculum construction - Agricultural Education	.49	.48
School administration - Agricultural Education	.70	.73

With 25 pairs of scores or ranks, a coefficient of .396 is required for significance at the 5 per cent level of significance, and a coefficient of .505 is required for significance at the 1 per cent level. Of six hypotheses formulated to the effect that the true correlation between scores or ranks is zero, all hypotheses were rejected, four at the 1 per cent level of significance and two at the 5 per cent level.

Tests of significance were applied to ascertain whether the difference between and among the product moment correlation coefficients were statistically significant. The null hypothesis that the true difference between the coefficients obtained between the administration and agricultural education sub-juries (.73) and the curriculum and agricultural education sub-juries (.48) was zero was tested and found to be tenable. Then the null hypothesis to the effect that there is no difference among the three coefficients (.65, .48, and .73) was tested, and also found to be tenable. These statistical tests indicate that, with twenty-five pairs of ratings involved, differences as great as those obtained might be expected to occur by chance.

As to individual items, twenty-five F tests were made to test a similar number of hypotheses that there were no variations among the three sub-juries as to mean scores received by purpose items. The mean scores for each sub-jury and the total jury are shown in Table IV-4. Hypotheses were not rejected for sixteen of the twenty-five purpose items. Nine hypotheses were rejected, two at the 1 per cent level of significance, and seven at the .1 per cent level. Examination of the data shows that where significant differences existed, specialists in agricultural education ranked the purpose items higher than the other two groups of specialists. Purpose items for which significant F values were obtained included purposes pertaining to occupational establishment and adjustment (Items 19 and 23), managerial behavior (Items 11, 13, 20, and 23), and farm mechanics instruction (Items 5 and 10).

Taken as a whole, the results of analyses of agreement indicated that there was substantial agreement among the jury members as to the relative importance of the purpose items. True, some indications of disagreement were observed. The agricultural education sub-jury tended to score items higher than the administration or curriculum sub-juries. But this action was to be expected in light of ego involvement of the agricultural education group. When the difference among scores assigned to individual items occured, the differences were for items which probably are related most closely with commonly accepted objectives of vocational education in agriculture elaborated in official publications of the Vocational Division of the United States Office of Education. Specific reference here is made to purpose items which pertained to occupational establishment and adjustment, which are related to instructional programs for out-of-school groups, and

TABLE IV - 4

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE WHETHER THREE SUB-JURIES OF EDUCATIONAL SPECIALISTS VARIED IN SCORES ASSIGNED TO TWENTY-FIVE PURPOSES OF VOCATIONAL AGRICULTURE

Purpose Rank	Purpose Number	Sub-Juries of Educational Specialists: Administration A	Curriculum B	Agri. educ. C	Total jury T	P
1	4	7.63	7.42	8.69	7.96	.001
2	20	6.91	7.24	8.46	7.60	.001
3	13	7.16	6.91	8.41	7.55	.001
4	11	7.00	7.06	8.36	7.53	.001
5	23	6.88	7.30	8.20	7.51	.01
6	25	7.59	7.48	7.33	7.46	NS
7.5	2	7.28	7.27	7.38	7.32	NS
7.5	6	7.03	7.09	7.74	7.32	NS
9	8	7.09	6.82	7.67	7.22	NS
10	22	6.63	6.91	7.82	7.16	.01
11	5	7.00	6.21	8.05	7.14	.001
12	3	6.66	7.15	7.51	7.13	NS
13	19	6.31	5.73	8.56	6.97	.001
14	7	6.44	7.06	6.92	6.82	NS
15	18	6.53	6.97	6.77	6.76	NS
16	10	7.00	5.79	7.26	6.71	.001
17	12	6.50	6.42	7.05	6.68	NS
18	17	6.13	6.70	6.87	6.59	NS
19	1	6.22	6.79	6.49	6.50	NS
20	9	6.53	6.33	6.54	6.48	NS
21	24	5.91	6.70	6.72	6.46	NS
22	15	6.13	5.94	6.69	6.41	NS
23	21	6.23	5.79	6.62	6.23	NS
24	14	5.94	6.06	6.54	6.20	NS
25	16	5.31	5.48	5.28	5.36	NS

to the development of mechanical abilities. In view of the relatively high positive correlation coefficients and significant agreement of scores assigned to sixteen of the twenty-five purpose items, it appeared reasonable to conclude that the three sub-juries were in substantial agreement as to the relative importance of the purpose items.

Summary

The data presented in Section I of this chapter denote that the scaling procedures used yielded a reliability coefficient sufficiently high to indicate that ratings of purpose items were applied with a high degree of consistency. In addition the data indicated that the three sub-juries, consisting of specialists in school administration, curriculum construction, and agricultural education, were in substantial agreement relative to the ratings assigned to the twenty-five purpose items.

II. THE ANALYSIS OF SCORES ASSIGNED BY SCHOOL RATERS

The list of twenty-five purposes of vocational agriculture was submitted to the principal of each cooperating high school, with instructions for the principal with the assistance of members of the staff responsible for teaching and administering the program to indicate the extent to which each purpose is accepted as a goal is the vocational agriculture program of the school. The result of analyses of ratings, together with comparisons between ratings of importance as obtained from the jury and ratings of acceptance as obtained from the school raters, are presented in this section.

The Efficacy of the Scoring Procedure

The data. The data used in deriving scores based on acceptance of purposes of vocational agriculture were the ratings of 41 school raters applied to Form 5 (Vocational Agriculture: Appraisal of Purposes).[6]

The derivation and analysis of scores based on purpose acceptance. School raters scored each item for extent of acceptance on a five point scale, ranging from 1 (no extent) to 5 (very great extent). Scores were assigned to purpose items by summing the quantitative value assigned to each item by the 41 raters. The number of school raters who checked each numerical category, and the total scores assigned to each of the 25 purposes of vocational agriculture, are shown in Table IV-5.

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[6] Infra, pp. A-13 ff.

TABLE IV - 5

THE NUMBER OF SCHOOL RATERS WHO CHECKED EACH NUMERICAL RESPONSE CATEGORY AND THE TOTAL SCORES ASSIGNED TO EACH OF TWENTY-FIVE PURPOSES OF VOCATIONAL AGRICULTURE, BASED ON ACCEPTANCE OF PURPOSES

Purpose number	Frequency of School Raters Who Checked Each Response Category: Response categories 1	2	3	4	5	Purpose Scores	Ranks
1	0	1	12	20	8	158	7
2	0	0	5	18	18	177	1
3	1	2	7	17	14	164	4
4	0	0	4	21	16	176	2.5
5	1	13	8	9	10	137	19
6	0	2	17	17	5	148	13
7	3	5	16	12	5	134	21.5
8	0	0	6	17	18	176	2.5
9	0	4	13	14	10	153	11
10	1	9	9	13	9	143	16
11	0	3	9	19	10	159	5.5
12	0	1	12	19	9	159	5.5
13	0	2	12	20	7	155	8.5
14	6	9	9	15	2	121	23
15	0	8	10	18	5	143	16
16	2	18	11	9	1	112	25
17	0	4	16	17	4	144	14
18	0	5	16	15	5	143	16
19	4	6	8	14	9	141	18
20	0	3	14	19	5	149	12
21	3	15	11	10	2	116	24
22	1	10	11	15	4	134	21.5
23	2	9	9	17	4	135	20
24	2	4	8	14	13	155	8.5
25	0	1	15	18	7	154	10

A reliability coefficient was computed for the data reported in Table IV-5 by the procedures described previously. The sum of squares for items was determined to be 171.4673, and the mean square for items (MS_I) with 24 degrees of freedom, was 7.1445. The sum of squares for error was 602.7727, and the mean square for error (MS_E), with 960 degrees of freedom, was .6279. The coefficient of reliability was ($MS_I - MS_E$) / MS_I, or (7.1445 - .6279) / 7.1445, or .912.

The hypothesis that random ratings were assigned to items was tested by an F test. With F = MS_I / MS_E, or 7.1445 / .6279, or 11.38, and with 24 and 960 degrees of freedom, the hypothesis was rejected at the .1 per cent level of significance. The results of these tests indicated that there was practically no possibility that random ratings were assigned to the purpose items by the school raters.

The least significant difference between any two totals shown in Table IV-5 also was calculated. The estimate of variance of any one total is N(MS_E), or 41 x .6279, or 25.7439, and the estimate of the variance of the difference between any two totals is (2) (N) (MS_E) or 51.4878. The standard error of the difference between any two totals, therefore, is estimated as 7.1755. The least significant difference between any two totals, at the 5 per cent level of significance, is 1.96, the critical value of t, times 7.1755, the standard error, or 14.06.

Inspection of the scores assigned by raters shown both in Tables IV-5 and IV-6 reveals the points where scores differed significantly. The scores of the four purpose items ranked highest by the schools did not differ significantly, nor did the scores of the three purpose items ranked lowest. But the three highest ranking items scored significantly higher than items ranking fifth or below, and the two lowest ranking items scored significantly lower than all items ranking twenty-second or higher.

Evidence of Agreement Between School Raters and Jury

Agreement between school raters and total jury. Two hypotheses were set up and tested to the effect that there was no difference in the scores and rankings assigned by the school raters for purpose acceptance, and the scores and rankings assigned by the jury of 104 educational specialists for purpose importance. The hypotheses were tested by correlation analyses and by the chi-square test of independency in contingency tables.

Results of the correlation analyses are shown in Table IV-6. The product moment correlation coefficient between the scores assigned by raters and the scores assigned by the jury was .62, and the rank order correlation coefficient was .46. The hypothesis that the true

TABLE IV-6

RANK ORDER AND PRODUCT MOMENT CORRELATIONS BETWEEN SCORES ASSIGNED TO VOCATIONAL AGRICULTURE PURPOSE ITEMS BY SCHOOL RATERS FOR PURPOSE ACCEPTANCE AND SCORES ASSIGNED BY TOTAL JURY AND THREE SUB-JURIES FOR PURPOSE IMPORTANCE

Scores Assigned by School Raters			Scores Assigned by Total Jury and Sub-Juries							
			Groups							
Purpose			Total Jury		Adminis.		Curriculum		Agri. Educ.	
Rank	Score	No.	Rank	Score	Rank	Score	Rank	Score	Rank	Score
1	177	2	7.5	761	3	233	4	240	12	288
2.5	176	4	1	828	1	244	2	245	1	339
2.5	176	8	9	751	5	227	13	225	10	299
4	164	3	12	742	12	213	6	236	11	293
5.5	159	11	4	783	8	224	8.5	233	5	326
5.5	159	12	17	695	16	208	17	212	15	275
7	158	1	19	676	19.5	199	14	224	24	253
8.5	155	13	3	785	4	229	11.5	228	4	328
8.5	155	24	21	672	24	189	15.5	221	19	262
10	154	25	6	776	2	243	1	247	13	286
11	153	9	20	674	14.5	209	18.5	210	22.5	255
12	149	20	2	790	16	208	17	212	15	275
13	148	6	7.5	761	6	225	7	234	9	302
14	144	17	18	685	21.5	196	15.5	221	17	268
16	143	10	16	698	8	224	22.5	191	14	283
16	143	15	22	667	21.5	196	18.5	210	20	261
16	143	18	15	703	14.5	209	10	230	18	264
18	141	19	13	725	18	202	24	189	2	334
19	137	5	11	743	8	224	20	205	7	314
20	135	23	5	781	11	220	3	241	6	320
21.5	134	7	14	709	17	206	8.5	233	16	270
21.5	134	22	10	745	13	212	11.5	228	8	305
23	121	14	24	645	23	190	21	200	22.5	255
24	116	21	23	648	19.5	199	22.5	191	21	258
25	112	16	25	557	25	170	25	181	25	206

	Correlation Coefficients	
	Rank order	Product moment
School raters - Total jury	.46	.62
School raters - Administration	.54	.73
School raters - Curriculum	.51	.62
School raters - Agricultural Education	.33	.43

correlation was zero was rejected in both instances. With 25 pairs of scores or ranks, a coefficient of .396 is significant at the 5 per cent level of significance, and a coefficient of .505 is significant at the 1 per cent level. Thus, the hypothesis was rejected at the 5 per cent level for the rank order coefficient, and at the 1 per cent level for the product moment coefficient.

To explore further the hypothesis of non-agreement, a chi-square test of independency in contingency tables was made to ascertain whether ratings assigned by school raters for the eight purposes ranked highest by the jury were independent of the ratings of the eight purposes ranked lowest. The results of this test are demonstrated in Table IV-7. This hypothesis was rejected at the .1 per cent level of significance. The results of these tests indicated substantial agreement between the acceptance of purposes of vocational agriculture by schools, and the rating of importance of these purposes by the jury.

A descriptive comparison of the intensity of ratings as assigned by the jury and by school raters is presented in Table IV-8. For the jury, the per cent of respondents under the "very great" column denotes the per cent of respondents who checked response categories "8" and "9". The per cent of jury members who checked response categories "6" and "7" is shown in the column headed "considerable", the per cent of jury members who checked response category "5" is shown in the column headed "moderate", and the per cent of jury members who checked response categories "1", "2", "3", or "4" is shown in the column headed "less than moderate." For the school raters, the per cent of raters who checked response category "5" is shown under the column headed "very great," the per cent of raters who checked response category "4" is shown under the column headed "considerable," the per cent of raters who checked response category "3" is shown under the column headed "moderate," and the per cent of raters who checked response categories "1" or "2" is shown in the column headed "less than moderate." Although caution was exercised in generalizing from the data in Table IV-8, especially in light of the variations of the scales on which responses were checked, there was evidence to indicate that the jury members tended to rate the purpose items somewhat higher for importance than the school raters rated them for acceptance.

Agreement between school raters and sub-juries. Rank order and product moment correlation coefficients were computed between the ranks and scores assigned to purpose items by the school raters and by each of the sub-juries. The results of these correlations are given in Table IV-6. The rank order coefficient between ranks assigned by school raters and specialists in school administration, curriculum construction, and agricultural education were .54, .51, and .30, respectively. The product moment coefficients were .73, .62, and .43, respectively. Hypotheses to the effect that the true correlation was zero were rejected for five

TABLE IV - 7

RESULTS OF TESTS OF SIGNIFICANCE TO ASCERTAIN WHETHER RATINGS ASSIGNED BY SCHOOLS TO EIGHT VOCATIONAL AGRICULTURE PURPOSE ITEMS RANKED HIGHEST BY JURY WERE INDEPENDENT OF RATINGS ASSIGNED BY SCHOOLS TO EIGHT PURPOSE ITEMS RANKED LOWEST BY JURY

Purpose		Frequency of School Raters Who Checked Response Categories				
		Response categories				Total
Rank	Number	1 - 2	3	4	5	ratings
1	4	0	4	21	16	41
2	20	3	14	19	5	41
3	13	2	12	20	7	41
4	11	3	9	19	10	41
5	23	11	9	17	4	41
6	25	1	15	18	7	41
7.5	2	0	5	18	18	41
7.5	6	2	17	17	5	41
Total of 8 high items		22	85	149	72	328
Per cent of total ratings in group		6.7	25.9	45.4	22.0	100.0
18	17	4	16	17	4	41
19	1	1	12	20	8	41
20	9	4	13	14	10	41
21	24	6	8	14	13	41
22	15	8	10	18	5	41
23	21	18	11	10	2	41
24	14	15	9	15	2	41
25	16	20	11	9	1	41
Total of 8 low items		76	90	117	45	328
Per cent of total ratings in group		23.2	27.4	35.7	13.7	100.0

Chi-square test of independency of frequency distribution - $P < .001$

TABLE IV - 8

A COMPARISON BETWEEN THE PERCENTAGE OF JURY MEMBERS WHO CHECKED SELECTED RESPONSE CATEGORIES FOR IMPORTANCE OF PURPOSES AND PERCENTAGE OF SCHOOL RATERS WHO CHECKED COMPARABLE CATEGORIES FOR ACCEPTANCE OF PURPOSES FOR TWENTY-FIVE PURPOSES OF VOCATIONAL AGRICULTURE

Purpose Rank	Purpose No.	Group	N	Level of Importance (Jury) or Extent of Acceptance (School): Very Great %	Considerable %	Moderate %	Less than Moderate %
1	4	Jury	104	67.3	27.9	3.8	1.0
		School	41	39.0	51.2	9.8	0
2	20	Jury	104	63.5	25.0	4.8	6.7
		School	41	12.2	46.3	34.1	7.3
3	13	Jury	104	56.7	32.7	6.7	3.8
		School	41	17.1	48.8	29.3	4.9
4	4	Jury	104	54.8	37.5	3.8	3.8
		School	41	24.4	46.0	22.0	7.3
5	23	Jury	104	59.6	28.8	5.8	5.8
		School	41	9.8	41.5	22.0	26.8
6	6	Jury	104	58.7	26.9	8.1	5.8
		School	41	17.1	43.9	36.6	2.4
7.5	2	Jury	104	49.0	36.5	8.7	5.8
		School	41	43.9	43.9	12.2	0
7.5	6	Jury	104	48.1	39.4	7.7	4.8
		School	41	12.2	41.5	41.5	4.9
9	8	Jury	104	55.8	26.0	7.7	10.6
		School	41	43.9	41.5	14.6	0
10	22	Jury	104	49.0	33.7	13.5	3.8
		School	41	9.8	36.6	26.8	26.8
11	5	Jury	104	44.2	34.6	12.5	8.7
		School	41	24.4	22.0	19.5	34.1
12	3	Jury	104	51.9	28.8	7.7	11.5
		School	41	34.1	41.5	17.1	7.3

TABLE IV - 8 (continued)

Purpose Rank	No.	Group	N	Level of Importance (Jury) or Extent of Acceptance (School) Very Great %	Considerable %	Moderate %	Less than Moderate %
13	7	Jury	104	38.5	35.6	16.3	9.6
		School	41	12.2	29.3	39.0	19.5
14	19	Jury	104	47.1	27.9	12.5	12.5
		School	41	22.0	34.1	19.5	2.4
15	18	Jury	104	39.4	34.6	14.4	11.5
		School	41	12.2	36.6	39.0	12.2
16	10	Jury	104	37.5	34.6	17.3	10.6
		School	41	22.0	31.7	22.0	24.4
17	12	Jury	104	32.7	38.5	24.0	4.8
		School	41	22.0	46.3	29.3	2.4
18	17	Jury	104	35.6	36.5	11.5	16.3
		School	41	9.8	41.5	39.0	9.8
19	1	Jury	104	35.6	26.9	24.0	13.5
		School	41	19.5	48.8	29.2	2.4
20	9	Jury	104	35.6	34.6	17.3	10.6
		School	41	24.4	34.1	31.7	9.8
21	24	Jury	104	41.3	26.9	13.5	18.3
		School	41	17.1	43.9	36.6	2.4
22	15	Jury	104	26.0	45.2	17.3	11.5
		School	41	12.2	43.9	22.4	19.5
23	21	Jury	104	27.9	34.6	20.2	17.3
		School	41	4.9	24.4	26.8	43.9
24	14	Jury	104	26.0	42.3	16.3	15.8
		School	41	4.9	36.6	22.0	36.6
25	16	Jury	104	13.5	39.4	17.3	29.8
		School	41	2.4	22.0	26.8	48.8

hypotheses at the 5 per cent level of significance. The correlation coefficient of .30 between rank order of purposes assigned by school raters and by the agricultural education sub-jury did not meet the criterion for rejection.

Based on the product moment correlations, indications of substantial agreement were obtained for all sub-juries with the school raters, with coefficients ranging from .43 to .73. A chi-square test was applied to ascertain whether the three correlations were drawn from a single population. A chi-square value of 2.434 was obtained, which failed to meet requirements for significance at the 5 per cent level. Thus, it was concluded that correlations of .73, .62, and .43, with N = 25 in each instance, could have been drawn from a common population. Using the r to z' transformation, an average z' of .705 was obtained which was transformed to .61, the average value of the three correlation coefficients. This was substantially the same value as the correlation coefficient obtained when the school raters scores were correlated with the scores assigned by the total jury.

It is noted from the data in Table IV-6 that the school raters agreed more closely with the administrative sub-jury (r = .73) than with the agricultural education sub-jury (r = .43). A null hypothesis to the effect that there was no difference between these coefficients was formulated and tested. The hypothesis failed to be rejected. Thus, it was concluded that differences as great as that observed between the correlation of scores assigned by school raters and the administration sub-jury, and by school raters and the agricultural education sub-jury could occur by chance.

Summary

The second section of Chapter IV dealt with the analysis of scores assigned to purpose items by school raters, and with ascertaining the extent to which scores assigned by school raters for purpose acceptance agreed with scores assigned by the jury for purpose importance. An internal consistency test of reliability of the scoring procedure applied by school raters yielded a reliability coefficient of .912. Correlation coefficients between the scores assigned by the school raters and the scores assigned by the jury indicated substantial agreement between the two sets of scores. This means that the school raters in the sample of 41 schools offering vocational agriculture programs tend to accept the twenty-five purposes of vocational agriculture in accordance with the order in which scores for importance were assigned by the jury in light of the contemporary design for vocational education.

SUMMARY OF CHAPTER IV

The primary purpose of Chapter IV was to obtain a score for each of twenty-five purposes of vocational agriculture, based on the ratings assigned by Jury I, (1) to denote the relative importance of the purpose items in relation to the contemporary design for vocational education, and (2) to serve as a basis for further quantifications of data. Evidence was presented in Section I to show that Jury I, as a group of raters, attacked the problem of assigning ratings to purposes systematically, there being practically no possibility that random ratings were assigned to the items. Moreover, there was evidence of substantial agreement among the specialists in school administration, curriculum construction, and agricultural education who comprised Jury I. The results of tests of reliability and of correlations between the sub-juries indicated that the scores assigned to the purpose items for importance were usable in further statistical analysis and treatment.

Section II of Chapter IV presented an analysis of scores assigned to purposes by school raters. The scores were assigned in terms of the extent each purpose was accepted as a goal in the vocational agriculture program of the school. Evidence was presented in Section II to show that the school raters attacked the problem of assigning scores to purposes systematically, the reliability coefficient being very high. The results of correlation coefficients and other statistical treatments demonstrated (1) that the school raters were in substantial agreement with the jury with regard to the order in which purposes were scored and ranked, (2) that although correlations between scores assigned by the school raters and by the sub-juries varied, the variations were not significant, and (3) that the ratings assigned by the jury for importance tended to be higher than the ratings assigned by the school raters for acceptance.

CHAPTER V

THE ASSIGNATION AND ANALYSIS OF OPERATIONAL SCORES FOR VOCATIONAL AGRICULTURE

Chapter V reports on how the data obtained from Forms 1J[1] and 6[2] were used to derive an operational score for each of twenty-five purposes of vocational agriculture for each program of vocational agriculture in the 41 school sample. The present chapter is divided into four sections: Section I describes the procedures used to obtain an indication of the relative educational value of instructional activities associated with each of the three levels of operation prepared for each purpose of vocational agriculture. Section II reports on the derivation of an operational score for each of the twenty-five purposes of vocational agriculture which was designated to quantify the operational effort and emphasis put forth by the school to attain a specific purpose. Section III pertains to the question of the extent to which schools are emphasizing the purposes in the order in which the purposes were ranked by Jury III. Section IV presents the results of a series of statistical analyses of operational scores obtained from the 41 school sample.[3]

I. THE QUANTIFICATION OF EDUCATIONAL VALUES OF LEVELS OF OPERATION

The results of ratings of the 55 members of Jury III, including 12 specialists in school administration, 24 specialists in curriculum construction, and 19 specialists in agricultural education, are presented in Section I. The problem presented to the members of this

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[1] Appraisal of Operational Levels: Vocational Agriculture, infra, pp. A-69 ff.

[2] Vocational Agriculture: Appraisal of Operational Levels, infra, pp. A-18 ff.

[3] The specific objectives treated in Chapter V, as were listed in Chapter I, are:

(6.) To obtain a score indicative of the operational emphasis and effort being put forth to attain each of twenty-five purposes of vocational agriculture.

(7.) To ascertain which of a selected group of variables are related to variations in scores assigned to schools as a measure of the relative amount of operational emphasis and effort put forth to attain a specific purpose.

jury was to appraise the relative educational value of three levels of operation for each of the twenty-five purposes of vocational agriculture. For each purpose, the jury members were asked to indicate the score they would assign to a school operating optimally at Level A, to assign a score to a school operating optimally at Levels A plus B, and to indicate a score they would assign a school operating optimally at Levels A plus B plus C. The data returned to the research staff on Form 13, therefore, indicated the cumulative ratings for A and B, and for A, B, and C.

From the raw data supplied by the members of the jury on Form 13, two series of adjustments were made to prepare the data for further statistical treatment and analysis. First, the ratings were adjusted so that the maximum rating assigned for a school operating at Levels A plus B plus C was ten. In most instances the jury member assigned a value of ten to denote the quantitative value of a school operating optimally at Levels A plus B plus C. In some instances, however, the full range of the scale was not used. In these cases, adjustments were made in the scores assigned by the raters so that the maximum value of ten was assigned to a school operating at Levels A plus B plus C. For example, if a school assigned a value of 2 to Level A, 6 for Level A plus B, and 8 to Level A plus B plus C, adjustments were made so that the adjusted values were 2.5 for Level A, 7.5 for Level A plus B, and 10 for Levels A plus B plus C.

Secondly, differential scores for each level of operation were computed. The actual or adjusted value assigned to Level A was used in all cases as the score for Level A. The difference between the actual or adjusted value assigned by the juror for Levels A plus B, and the value assigned by a juror for Level A was used as the score for Level B. The difference between the actual or adjusted value assigned for Levels A plus B plus C, and the actual or adjusted values assigned for Levels A plus B was used as the score for the juror for Level C. The differential scores thus obtained were assumed to indicate the relative importance of Levels A, B, and C operations for each purpose of vocational agriculture. Subsequent discussion of the scores obtained from Jury III refer to the adjusted differential score for each level of operation for each purpose.

Summarization of the Scoring Procedure for Data Supplied by Jury III

The mean quantitative values assigned by each of the three sub-juries and by the total jury for each level of operation for each of the twenty-five purposes of vocational agriculture are shown in Table V-1. Table V-1 also lists each of the twenty-five purposes of vocational agriculture, together with the descriptive statement of each of the three levels of operation for each purpose. In addition,

TABLE V - 1

TABLE GIVING DESCRIPTIVE STATEMENTS OF LEVELS OF OPERATION, MEAN QUANTITATIVE VALUES ASSIGNED BY JURIES TO EACH LEVEL FOR EACH PURPOSE OF VOCATIONAL AGRICULTURE, AND SCORES AVAILABLE TO SCHOOLS FOR EACH CATEGORY

Purposes / Levels of Operation	Mean quantitative value assigned by juries				Score values available to schools for each rating category				
	Groups				Ratings				
	Adm.	Cur.	Ag.Ed.	Total	0	1	2	3	4
1. To assist students in developing an appreciation of the economic contributions of agriculture to society.									
A. Direct study and discussion of the economic contributions of agriculture to society - - - - - -	3.31	3.81	3.05	3.44	0	8.5	17.0	25.5	34.0
B. Conduct appropriate studies to determine the economic importance of agriculture in the community -	2.92	2.76	3.28	2.98	0	7.5	15.0	22.5	30.0
C. Direct analysis of data from local, state, and national sources to determine present and future importance of economic contributions of agriculture -	3.77	3.43	3.67	3.59	0	9.0	18.0	27.0	36.0
2. To assist students in developing an appreciation for and an understanding of technological developments in agriculture.									
A. Direct study and discussion of technological advances in agriculture- - - - - - - - - - - - -	3.42	3.23	3.13	3.23	0	8.0	16.0	24.0	32.0
B. Survey the community to ascertain the extent to which technological advances have been put to use	3.14	3.64	3.69	3.55	0	9.0	18.0	27.0	36.0
C. Design applications of technological developments to farming or other agricultural conditions- -	3.44	3.13	3.19	3.22	0	8.0	16.0	24.0	32.0

TABLE V-1 (continued)

Purposes / Levels of operation	Mean quantitative value assigned by juries (Groups)				Score values available to schools for each rating category (Ratings)				
	Adm.	Cur.	Ag.Ed.	Total	0	1	2	3	4
3. To assist students in developing traits, such as cooperation, industry, and initiative, essential for successful occupational adjustment and human relations.									
A. Direct study and discussion of traits essential for successful occupational adjustment - - - - -	3.17	2.66	2.87	2.84	0	7.0	14.0	21.0	28.0
B. Provide individual counseling services to assist students in self-analysis and self-improvement -	3.97	4.10	3.46	3.85	0	9.8	19.5	29.2	39.0
C. Initiate group activities to provide opportunities for developing desirable traits- - - - - -	2.86	3.24	3.68	3.31	0	8.2	16.5	24.8	33.0
4. To assist students in developing the ability to organize and apply technical agricultural knowledge and information to the solution of farm problems.									
A. Direct study and discussion of technical agricultural subject matter- - - - - - - - - - - - -	3.17	2.86	2.64	2.85	0	7.0	14.0	21.0	28.0
B. Identify general problems of farmers, and decide on solution of problems in terms of appropriate technical data - - - - - - - - - - - - - - -	2.87	2.87	3.19	2.98	0	7.5	15.0	22.5	30.0
C. Identify specific problems related to specific farm operations, decide upon a solution, and test and evaluate conclusions under actual or simulated job conditions - - - - - - - - - - - - - - - -	3.97	4.28	4.17	4.17	0	10.5	21.0	31.5	42.0

TABLE V-1 (continued)

Purpose	Levels of operation	Mean quantitative value assigned by juries (Groups)				Score values available to schools for each rating category (Ratings)				
		Adm.	Cur.	Ag.Ed.	Total	0	1	2	3	4
5. To assist students in developing abilities to maintain, operate, and adjust farm power, machinery, and equipment.										
	A. Direct study and discussion of the operation, maintenance, and adjustment of farm power, machinery, and equipment - - - - - - - - - - - -	2.66	2.67	2.44	2.59	0	6.5	13.0	19.5	26.0
	B. Provide actual experiences in the operation, adjustment, and maintenance of farm power, machinery, and equipment - - - - - - - - - - - -	4.78	5.84	6.42	5.81[a]	0	14.5	29.0	43.5	58.0
	C. Organize activities to develop understanding of scientific principles related to the operation of farm power, machinery, and equipment- - - - -	2.56	1.49	1.44	1.61	0	4.0	8.0	12.0	16.0
6. To assist students in developing abilities essential to maintaining healthful and safe conditions on the farm and in the home.										
	A. Direct study and discussion of health and safety practices- -	3.36	3.05	3.34	3.22	0	8.0	16.0	24.0	32.0
	B. Organize activities, integrated with appropriate units, to improve health and safety practices in the classroom and shop - - - - - - - - - - - - -	2.80	3.12	3.58	3.21	0	8.0	16.0	24.0	32.0
	C. Plan, develop, and carry out a long-range community program to improve health and safety practices on the farm and in the home- - - - - - - - - - -	3.84	3.84	3.07	3.57	0	9.0	18.0	27.0	36.0

TABLE V-1 (continued)

Purposes / Levels of operation	Mean quantitative value assigned by juries (Groups)				Score values available to schools for each rating category (Ratings)				
	Adm.	Cur.	Ag.Ed.	Total	0	1	2	3	4
7. To assist persons in exploring the redirection of agricultural patterns, practices, and concepts.									
A. Direct study and discussion of new agricultural patterns, practices, and concepts- - - - - - - -	2.43	3.87	2.92	3.23[a]	0	8.0	16.0	24.0	32.0
B. Demonstrate new agricultural patterns, practices, and concepts in the community- - - - - - - - - -	3.46	3.34	4.24	3.68[b]	0	9.2	18.5	27.8	37.0
C. Organize planning groups to implement new agricultural patterns, practices, and concepts - - -	4.11	2.79	2.84	3.10[b]	0	7.8	15.5	23.2	31.0
8. To assist students in developing abilities essential for assuming leadership and citizenship roles.									
A. Direct study and discussions of knowledge and skills requisite for successful acceptance of leadership and citizenship roles - - - - - - - -	3.29	2.53	2.90	2.82	0	7.0	14.0	21.0	28.0
B. Organize and direct activities to provide experiences in leadership and citizenship responsibilities in the classroom and shop- - - - - - - -	3.25	4.38	3.60	3.87[b]	0	9.8	19.5	29.2	39.0
C. Plan, develop, and carry out projects to provide direct experiences in leadership and citizenship responsibilities in the school and community - -	3.46	3.09	3.50	3.31	0	8.2	16.5	24.8	33.0

TABLE V-1 (continued)

Purposes / Levels of operation	Mean quantitative value assigned by juries (Groups)				Score values available to schools for each rating category (Ratings)				
	Adm.	Cur.	Ag.Ed.	Total	0	1	2	3	4
9. To assist persons in understanding and interpreting the role of agriculture in society.									
A. Give talks, exhibit displays, and otherwise informally interpret agriculture to the school community	5.25	4.25	4.92	4.70	0	11.8	23.5	35.2	47.0
B. Organize an informal education program to interpret agriculture to the community	2.21	3.46	2.05	2.71	0	6.8	13.5	20.2	27.0
C. Organize formal programs of instruction, for all age levels, to interpret agriculture to the community	2.54	2.29	3.02	2.60	0	6.5	13.0	19.5	26.0
10. To assist students in developing mechanical skills, such as carpentry, welding, and cold metal work, involved in farm improvement and maintenance.									
A. Direct study and discussion of mechanical skills needed by farmers	3.34	1.89	2.72	2.49[b]	0	6.2	12.5	18.8	25.0
B. Direct the performance of mechanical skills in the shop	3.31	4.68	3.87	4.10[b]	0	10.2	20.5	30.8	41.0
C. Direct the application of skills under actual or simulated job conditions	3.35	3.43	3.41	3.41	0	8.5	17.0	25.5	34.0

TABLE V-1 (continued)

Purposes / Levels of operation	Mean quantitative value assigned by juries (Groups)				Score values available to schools for each rating category (Ratings)				
	Adm.	Cur.	Ag.Ed.	Total	0	1	2	3	4
11. To assist students in developing abilities to understand marketing processes and to market products and services profitably.									
A. Direct study and discussion of farm marketing processes and practices	3.88	3.44	3.29	3.48	0	8.8	17.5	26.2	35.0
B. Analyze existing practices pertaining to marketing farm products and services	2.65	2.60	2.89	2.71	0	6.8	13.5	20.2	27.0
C. Plan, develop, and carry out activities to provide practical experiences in marketing products and services	3.47	3.96	3.82	3.81	0	9.5	19.0	28.5	38.0
12. To assist students in developing non-mechanical (i.e., manipulative and identification) skills, such as pruning fruit trees, identifying weed seeds, and culling hens, involved in farm production and improvement.									
A. Direct study and discussion of manipulative and identification skills	2.90	2.41	2.26	2.46	0	6.2	12.5	18.8	25.0
B. Direct the performance of skills in laboratory, shop, classroom, or on a farm	4.10	4.73	4.91	4.65	0	11.5	23.0	34.5	46.0
C. Direct the application of skills under actual or simulated job conditions	3.00	2.86	2.84	2.88	0	7.2	14.5	21.8	29.0

TABLE V-1 (continued)

Purposes / Levels of operation	Mean quantitative value assigned by juries (Groups)				Score values available to schools for each rating category (Ratings)				
	Adm.	Cur.	Ag.Ed.	Total	0	1	2	3	4
13. To assist persons in critically analyzing the economic requirements essential for establishing and maintaining efficient farming units.									
A. Direct study and discussion of efficient farming units- -	3.69	3.71	3.01	3.46	0	8.5	17.0	25.5	34.0
B. Analyze and interpret farm records, and identify efficiency factors affecting farm income - - - -	3.34	3.26	3.50	3.36	0	8.5	17.0	25.5	34.0
C. Direct the application of criteria (i.e., efficiency factors) to help beginning or established farmers make independent judgments concerning the economic possibilities of specific farming units-	2.97	3.03	3.49	3.18	0	8.0	16.0	24.0	32.0
14. To assist out-of-school youth and adults enter into and/or become more effectively established in farm-related occupations.									
A. Organize and conduct formal programs of instruction to help persons become established in farm-related occupations- - - - - - - - - - - - - - - -	4.32	4.15	4.11	4.18	0	10.5	21.0	31.5	42.0
B. Hold regular conferences with persons becoming established in farm-related occupations to help work out problems encountered in these occupations- -	3.38	3.61	3.42	3.49	0	8.8	17.5	26.2	35.0
C. Organize and conduct intensive and extensive technical courses at post high school levels - -	2.28	2.24	2.47	2.33	0	5.8	11.5	17.2	23.0

TABLE V-1 (continued)

Purposes / Levels of operation	Mean quantitative value assigned by juries — Groups: Adm.	Cur.	Ag.Ed.	Total	Score values available to schools for each rating category — Ratings: 0	1	2	3	4
15. To assist students in exploring the possibilities of employment in agricultural occupations.									
A. Direct study and discussion of general nature of agricultural occupations	4.07	3.34	3.44	3.53	0	8.8	17.5	26.2	35.0
B. Survey the community to determine the types of and employment in agricultural occupations in the community	2.50	3.89	3.05	3.30[a]	0	8.2	16.5	24.8	33.0
C. Analyze the nature, training requirements, and current and future demands for agricultural workers at local, state, national, and global levels	2.78	3.43	3.51	3.17	0	8.0	16.0	24.0	32.0
16. To assist persons in developing interests and abilities of an avocational nature (e.g., aesthetic appreciations and leisure time activities, such as landscaping, gardening, and establishing lawns), related to agriculture.									
A. Discuss avocational problems and practices informally with persons in the school community	3.46	2.97	3.26	3.17	0	8.0	16.0	24.0	32.0
B. Organize and conduct topical discussions, for informal group meetings, dealing with avocational abilities related to agriculture	2.96	3.12	3.03	3.06	0	7.5	15.0	22.5	30.0
C. Plan, develop, and carry out instructional programs including special courses and club activities at all age levels, dealing with avocational aspects of agriculture	3.58	3.92	3.72	3.77	0	9.5	19.0	28.5	38.0

TABLE V-1 (continued)

Purposes / Levels of operation	Mean quantitative value assigned by juries				Score values available to schools for each rating category				
	Groups				Ratings				
	Adm.	Cur.	Ag.Ed.	Total	0	1	2	3	4
17. To assist high school students in formulating realistic occupational goals.									
A. Encourage students who express verbal interest in agriculture to prepare for an agricultural occupation	3.07	2.57	3.55	3.02	0	7.5	15.0	22.5	30.0
B. Determine levels of aptitude and interest in agricultural occupations	3.74	3.47	2.99	3.36	0	8.5	17.0	25.5	34.0
C. Provide try-out and directed work experiences in agricultural occupations	3.19	3.96	3.46	3.62	0	9.0	18.0	27.0	36.0
18. To assist students in developing an appreciation for the place of agriculture in the emerging pattern of American society.									
A. Direct study and discussion of the cultural patterns of rural communities	4.27	3.88	3.94	3.98	0	10.0	20.0	30.0	40.0
B. Examine the similarities and differences of cultural patterns in rural and urban communities	2.65	2.47	2.09	2.38	0	6.0	12.0	18.0	24.0
C. Organize learning experiences to inculcate better understanding between rural and urban groups	3.08	3.65	3.98	3.64	0	9.0	18.0	27.0	36.0

TABLE V-1 (continued)

Purposes / Levels of operation	Mean quantitative value assigned by juries — Groups Ag.	Ec.	Ag.Ed.	Total	Score values available to schools for each rating category — Ratings 0	1	2	3	4
19. To assist out-of-school youth and adults enter into and/or become more effectively established in farming.									
A. Organize and conduct formal programs of instruction to help persons become established in farming	4.82	3.64	4.90	4.33[b]	0	10.8	21.5	33.2	43.0
B. Hold regular conferences with persons becoming established in farming to plan farming operations	2.73	3.93	2.62	3.22[b]	0	8.0	16.0	24.0	32.0
C. Organize and conduct advanced intensive and extensive technical courses, at post high school levels	2.45	2.43	2.48	2.45	0	6.2	12.5	19.8	25.0
20. To assist students in developing abilities to organize land, labor, and capital resources into an efficient producing unit.									
A. Direct study and discuss the theories and practices of farm organization, including farm and soil management, finances, records, and utilization of land resources	4.12	3.72	3.38	3.69	0	9.2	18.5	27.8	37.0
B. Analyze existing farm operations, and outline alternate patterns of farm organization	2.75	2.72	3.13	2.87	0	7.2	14.5	21.8	29.0
C. Plan, develop, and carry out systematic projects to provide practical experience in organizing the land, labor, and capital resources on a farm	3.13	3.56	3.49	3.44	0	8.5	17.0	25.5	34.0

TABLE V-1 (continued)

Purposes / Levels of operation	Mean quantitative value assigned by juries (Groups: Adm. / Our. / Ad.Ed. / Total)				Score values available to schools for each rating category (Ratings: 0 / 1 / 2 / 3 / 4)				
21. To assist high school students in obtaining employment in appropriate agricultural occupations.									
A. Direct study and discussion of placement opportunities	3.78	3.01	3.72	3.42	0	8.5	17.0	25.5	34.0
B. Survey the community to locate placement opportunities	2.68	3.68	2.55	3.07[b]	0	7.8	15.5	23.2	31.0
C. Assist students in obtaining employment in jobs which utilize particular competencies possessed by students	3.54	3.31	3.74	3.51	0	8.8	17.5	26.2	35.0
22. To assist students in developing abilities to procure and utilize efficiently equipment, supplies, and services.									
A. Direct study and discussion of procurement of farm equipment, supplies, and services	3.43	3.01	3.08	3.13	0	7.8	15.5	23.2	31.0
B. Analyze existing practices pertaining to procuring and utilizing equipment, supplies, and services	2.90	2.79	3.15	2.94	0	7.2	14.5	21.8	29.0
C. Plan, develop, and carry out projects to provide practical experience in procuring and utilizing equipment, supplies, and services	3.67	4.20	3.77	3.94	0	10.0	20.0	30.0	40.0

TABLE V-1 (continued)

Purposes / Levels of operation	Mean quantitative value assigned by juries: Groups Adm.	Our.	Ag.Ed.	Total	Score values available to schools for each rating category: Ratings 0	1	2	3	4
23. To assist persons established in farming in adjusting to changing occupational conditions in farming.									
A. Organize and conduct formal programs of instruction to help persons, established in farming, adjust to changing agricultural conditions - - - -	4.73	3.50	4.35	4.10	0	10.2	20.5	30.8	41.0
B. Hold regular conferences with persons established in farming to plan farming operations- - - - - -	2.91	4.10	2.52	3.19[b]	0	8.0	16.0	24.0	32.0
C. Organize and conduct advanced intensive and extensive technical courses, at post high school levels -	2.84	2.33	3.14	2.72	0	6.8	13.5	20.2	27.0
24. To assist academically talented students in preparing for education beyond the high school level.									
A. Counsel informally with academically talented students and encourage them to intensify their educational efforts- - - - - - - - - - - - - - - -	4.79	3.78	4.90	4.39	0	11.0	22.0	33.0	44.0
B. Provide enriched experiences within regular course offerings, to challenge academically competent students- - - - - - - - - - - - - - - - - -	2.83	3.76	3.64	3.52	0	8.8	17.5	26.2	35.0
C. Provide advanced courses in agricultural science for prospective college students - - - - - - - -	2.38	2.47	1.46	2.10	0	5.2	10.5	15.8	21.0

TABLE V-1 (continued)

Purposes / Levels of operation	Mean quantitative value assigned by Juries (Groups: Adm.	Cur.	Ag.Ed.	Total)	Score values available to schools for each rating category (Ratings: 0	1	2	3	4)
25. To assist students in developing an understanding of scientific knowledge, concepts, and methods related to agriculture.									
A. Direct study and discussion of the nature of scientific thought and practice	3.35	3.34	3.36	3.35	0	8.5	17.0	25.5	34.0
B. Develop projects to apply products of scientific practice and thought	3.66	3.87	4.21	3.94	0	9.8	19.5	29.2	39.0
C. Create and design experiments to add to the fund of scientific knowledge	2.99	2.79	2.43	2.71	0	6.8	13.5	20.2	27.0

[a] Hypothesis is that the true difference among means is zero rejected at one percent level of significance.

[b] Hypothesis is that the true difference among means is zero rejected at five percent level of significance.

the results of a series of statistical tests applied to test the hypothesis for each of the three levels of operation for the twenty-five purposes of vocational agriculture, that there was no difference in the scores assigned by the three sub-juries to each level of operation for each purpose are presented. Additional information presented in Table V-1, pertaining to score values available to schools for each rating category, will be discussed in a later sub-section of Section I.

Two general conclusions may be drawn from detailed examination of the data presented in Table V-1 pertaining to mean quantitative values assigned by the sub-juries and the total jury. In the first place, the data indicate substantial agreement among the three sub-juries as to the relative educational value of activities suggested or implied by each of the three levels of operation. Of the seventy-five null hypotheses tested, sixty-three were not rejected. Twelve hypotheses were rejected, three at the 1 per cent level of significance, and nine at the five per cent level. Rejection at the 5 per cent level is indicated by superscript "a" following the score for the total jury, and rejection at the 5 per cent level is indicated in Table V-1 by superscript "b" following the mean quantitative value for the total jury.

Detailed examination of the purposes for which differences were obtained indicates that seven of the twelve significant differences occurred for operations pertaining to only three purposes. Significant differences were obtained for mean quantitative values assigned by juries for all three levels of operation for Purpose No. 7, "to assist persons in exploring the redirection of agricultural patterns, practices, and concepts." Curriculum specialists assigned a higher value, than did the administration and agricultural specialists, to the Level A activities which pertained to the study and discussion of new agricultural patterns, practices, and concepts. The agricultural education specialists assigned a higher value than did the administration and curriculum specialists to Level B activities, which involved the demonstration of new agricultural patterns, practices, and concepts in the community. The administration specialists assigned a higher value than did the curriculum and agricultural education specialists to Level C activities, which provided for the organization of planning groups to implement new agricultural patterns, practices, and concepts. Significant differences were obtained for Levels A and B type of activities for Purpose No. 10, "to assist students in developing mechanical skills . . . involved in farm improvement and maintenance." Administration specialists assigned a higher value, than did the curriculum and agricultural education specialists, to Level A activities, which involved the study and discussion of mechanical skills needed by farmers. Curriculum specialists assigned a higher

value, than did administration or agricultural education specialists, to Level B type of activities which involved the performance of mechanical skills in the shop. Significant differences were also obtained between the mean quantitative values assigned by the three sub-juries to Levels A and B operations for Purpose No. 19, "to assist out-of-school youth and adults enter into and/or become more effectively established in farming." The curriculum specialists rated the Level A activities--the organization and conducting of formal programs of instruction--lower than did the administration or agricultural education specialists, and rated the Level B activities--which involved holding individual conferences with persons involved in becoming established in farming--higher than did either of the other two sub-juries. The remaining five significant differences were scattered randomly among five of the remaining twenty-two purposes. In general, it would appear that where differences existed, the administration sub-jury tended to rate lower the levels of operation which would necessitate relatively large expenditure of funds, and the curriculum sub-jury tended to rate higher the levels of operation which suggested activities characteristic of experience units of instruction.

In the second place, analyses of the data in Table V-2 indicate that when the operation of the total educational program is considered, traditional study-discussion types of activities, such as those which generally were reflected in Level A for each purpose, are assigned relatively low ratings in terms of their educational value to attain purposes of vocational agriculture. This generalization is substantiated by data presented in Table V-2. The data in Table V-2, which were based on mean quantitative values assigned by each jury member to each level of operation, show both the mean values assigned by raters for the total twenty-five purposes and the mean value assigned by jury members for each purpose. On the average, it will be noted, the total jury assigned a mean value of 3.42 to Level A type of activities, 3.43 to Level B type of activities, and 3.15 to Level C type of activities. Thus, it may be generalized that, for a school to operate effectively a program of vocational agriculture, physical and human resources must be available to permit operation beyond the sphere of Level A type of activities.

A series of three F tests was made to test the null hypothesis to the effect that the three sub-juries did not differ in the mean scores assigned to each of the three levels of operation. The data in Table V-2 show that the administration sub-jury tended to rate the Level A operations higher than did the curriculum and agricultural education sub-juries, whereas the curriculum sub-jury tended to rate the Level B activities higher than did the other two sub-juries. None of the three hypotheses was rejected. Differences as large as those observed in Table VI-2 could occur by chance

TABLE V-2

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE WHETHER THREE SUB-JURIES DIFFERED SIGNIFICANTLY IN RATINGS ASSIGNED TO THREE LEVELS OF OPERATION FOR TWENTY-FIVE PURPOSES OF VOCATIONAL AGRICULTURE

Sub-juries	N	Mean Ratings for Three Levels					
		Level "A"		Level "B"		Level "C"	
		Raters	Items	Raters	Items	Raters	Items
School administrators	12	94.44	3.77	78.30	3.13	77.72	3.10
Curriculum specialists	24	81.37	3.25	90.10	3.60	78.53	3.15
Agricultural educators	19	85.46	3.42	85.10	3.40	79.44	3.18
		P>.05		P>.05		P>.05	
Total jury (Average)	55	85.63	3.42	85.80	3.43	78.67	3.15

Summary. Three observations may be made in summary: (1) The members of three sub-juries were in substantial agreement regarding the relative educational value to be assigned to levels of operation for the twenty-five purposes of vocational agriculture. Where differences existed, the administration sub-jury tended to rate relatively low, as compared with the other two juries, levels of operations which implied heavy expenditure of funds, and the curriculum sub-jury tended to rate relatively high levels of operation which were characteristic of an experience approach to teaching. (2) Based on the results of the data, a school program in which operations were limited to study and discussion type of activities, would receive an operational score of approximately 35 per cent of the maximum operational score available to the school. (3) The three sub-juries were in substantial agreement with regard to judgments as to the relative educational value of each of the three levels of operation.

II. DERIVING OPERATIONAL SCORES FOR SCHOOLS

Section II of the present chapter is devoted to describing the procedure used to derive an operational score for each of twenty-five purposes for each of the forty-one schools in the sample. The data on which the operational scores were based were obtained during visits to each of the forty-one schools in the sample. Essentially the procedure was to determine a rating for each level of operation for each purpose of the forty-one schools, and to transfer the rating to a score by using the data supplied in Table V-1.

Obtaining Ratings for Levels of Operation

Prior to conducting the observational interviews in the 41 school sample, try-outs of the instruments and rating procedures were used in a number of schools not included in the sample. Inasmuch as the interviews were conducted by a research team of six persons, including the three project directors, one research associate, and two research assistants, the primary purpose of the try-out procedure was to ascertain the extent to which the members of the team were in agreement with regard to the assigning of ratings to the rating categories. In the try-out procedure one member of the research team assumed the initiative for conducting the interview. To initiate the rating procedure, a broad "open-end" type of question, such as "Are you concerned with this purpose?" or "What are you doing to attain this purpose?" was asked preceding the rating of each purpose. Specific questions then followed, designed to get information regarding the extent of operation at each level. In assigning ratings at each of the three levels of operation, considerations were given to six major points, including (1) the relative amount of time devoted to the purpose; (2) the scope of learning activities utilized in obtaining the purpose; (3) the importance attached to teaching techniques, as denoted both by oral interview and by observations in the classroom, laboratory, or shop; (4) the over-all quality and extensiveness of activities indicated by interviewees; (5) the indications of adequacy of resources which permit operations to attain a purpose; and (6) the visual evidence of extensiveness of operations to attain a purpose.

In conducting the observation interview, both in the try-out and actual situations, the interviewers used Form 6, Appraisal of Operations: Vocational Agriculture,[4] as a guide to the questioning and observing process. Each purpose in the list of twenty-five purposes was considered separately. One member of the

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[4] Infra, pp. A - 18 ff.

research staff assumed responsibility for initiating and conducting the interview, while the other members of the staff listened, asked supplementary questions, and applied ratings to the instrument. The amount of time devoted to interrogating the interviewee on each purpose was left largely to the discretion of the interviewer. The questioning process continued for each purpose for each of the three levels of operation until the interviewer and associates were satisfied that adequate information had been obtained on which to apply a rating.

After the interviews had been completed in the try-out schools, checks were made to ascertain the extent of agreement among the six members of the research team. The single classification of analysis variance technique was used to ascertain if ratings assigned by individual members of the research team differed significantly. A hypothesis to the effect that there was no difference in the ratings assigned by the six members of the team was not rejected; consequently, it was decided that the rating procedure was satisfactory and could be used in the forty-one schools in the sample.

Collecting data from the schools. An appointment was made with each principal of the forty-one schools in the sample for a date when one or more members of the research staff could visit the school and conduct the observational interview in the school. Prior to the date of the visit, a letter of instructions[5] and a copy of Form 5, Appraisal of Purposes: Vocational Agriculture[6], were sent to the principal. The principal was requested to elicit the cooperation of the teacher or other members of the staff responsible for teaching the vocational agriculture instruction to rate the twenty-five purposes on the form in terms of the extent to which they were accepted as goals in the vocational agriculture program of the school.[7] Thus, when the teacher was contacted during the visit to the school, he previously had seen the list of purposes on which the research was based, and was somewhat familiar with the nature of the research project. When the teacher was contacted, the project was briefly explained to him, and he was asked to participate in the study by answering questions regarding the extensiveness of the operation of his program. During the preliminary discussion it was emphasized to the teacher that the primary purpose of the study was to ascertain the extent to which schools in the state of Indiana are operating programs of vocational agriculture in

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[5] See Appendix B, infra, pp. B - 7.

[6] Infra, pp. A - 13 ff.

[7] Supra, pp. 31, 40.

accordance with contemporary social, economic, and technical trends. It further was emphasized to him that the study was being conducted in forty-one schools of the state which were selected in accordance with random procedures.

In assigning ratings to the operations of the teachers included in the sample, the same general procedures used in the try-out schools were used in the actual study. Generally two members of the research team collaborated in the interviewing and observing. One member of the team assumed responsibility of asking the questions and also indicated his reactions as to the extent of operations at each level on the interview instrument, Form 6. The second member of the team asked supplementary questions and indicated his reaction as to the extent of operation on his interview form. Approximately one hour was required to conduct each interview in the school.

When two persons conducted the interview, a conference was held afterward and a master rating was compiled. There were 75 ratings for operations assigned to each teacher, and of this number complete agreement was achieved on more than one-half of the ratings where two or more persons conducted the interview. Disagreements were minor, generally not more than one rating apart. Where there was a difference in rating, notes taken during the interview were consulted and ratings were adjucated so that both interviewers were satisfied with the rating ultimately assigned to the teacher.

Deriving Operational Scores for Schools

Determining the quantitative value of a rating. In deriving operational scores for schools in the study, it was determined arbitrarily that the maximum score available to a school, which received ratings of 4 for all three levels, would be 100. The maximum score available for each level was determined by the scores of Jury III, as shown in Table V-1. Since the jury ratings were computed on the basis of a maximum score of ten points, the ratings applied by the jury were transposed to maximum scores available for each level by multiplying the jury score for a specific level by ten and rounding to the nearest whole number. For example, the mean quantitative value assigned by the jury for Level A of Purpose No. 1 was 3.44 which was converted to a maximum operational score for this level of 34.0, the value for Level B was 2.98, which was converted to 30.0, and the value for Level C was 3.59, which was converted to 36.0.

To determine values to be used in computing operational scores where ratings of less than 4 were assigned for operational effort and emphasis at a specified level, the maximum score available for each level was partialled into four parts in accordance

with an assumption of equal distance between the rating categories. Thus, for Level A of Purpose No. 1, where the maximum operational score available was 34.0, the value assigned for a rating of 0 was 0, for a rating of 1 was 8.5, for a rating of 2 was 17.0, and for a rating of 3 was 25.5. The score values available to schools for each rating category on Form 6 also are shown in Table V-1.

Determining operational scores for each purpose for each school. Operational scores for each purpose for each school were determined by summing the score values available to schools for each rating category for each purpose, based on the rating assigned to the school on Form 6. Thus, if a school received a rating of 3 on Level A of Purpose No. 1, a rating of 2 for Level B, and a rating of 1 for Level C, the operational score was 25.5 plus 15.0 plus 9.0, or 49.5.

Description of Operational Scores

The present sub-section presents information on (1) the means and ranges of operational scores obtained for the 41 school sample of programs of vocational agriculture, and (2) a description of the extent to which schools were operating programs of vocational agriculture at each of the three levels of operation.

Means and ranges of scores. The means and standard deviations for each of the twenty-five purposes of vocational agriculture are shown in Table V-3. According to the data in Table V-3, scores range from a low of 10.91 for Purpose No. 14 to a high of 65.47 for Purpose No. 12. The average mean score for the twenty-five purposes was 46.06. Observation of the data reveals that the schools in the sample were not placing uniform emphasis upon the 25 purposes of vocational agriculture, as indicated by the wide variations in the mean operational scores. Further, the data indicate that the schools varied in terms of the relative emphasis placed upon each purpose, as indicated by the measures of dispersion presented in Table V-3. The measures of dispersion included the range, the semi-interquartile range, and the intervals between -1 and +1 standard deviations. Parenthetically, it may be noted that the data in Table V-3 indicate that for each of the purposes of vocational agriculture, the dispersion of scores approximates a normal distribution. This observation is made on the basis of comparing the median score with the mean score, and by comparing the score for -1 standard deviation with the score for the 25th percentile and by comparing the score for +1 standard deviation with the 75th percentile. Insofar as the scores obtained for each purpose are indicative of the operational effort and emphasis being put forth by the programs in the 41 school sample, the data suggest that the vocational programs in the sample may be characterized more by their diversity than by their uniformity.

TABLE V - 3

TABLE SHOWING MEANS AND DISPERSIONS OF OPERATIONAL SCORES ASSIGNED TO FORTY-ONE VOCATIONAL AGRICULTURE PROGRAMS

Purpose number	$\bar{X}$	s	Low score	$\bar{X}$-1s	Q_1	Median	Q_3	$\bar{X}$+1s	High score
1	47.16	16.83	17.0	30.33	34.5	42.5	58.5	63.99	75.0
2	52.83	16.56	17.0	36.27	42.0	50.0	67.0	69.39	84.0
3	54.56	18.55	14.0	36.01	41.7	57.0	68.0	73.11	100.0
4	63.32	17.76	7.5	45.56	57.0	64.5	75.0	81.08	89.5
5	53.90	23.80	6.5	30.10	34.0	52.5	77.5	77.70	96.0
6	49.51	19.51	16.0	30.00	40.0	48.0	66.0	69.02	100.0
7	40.15	15.29	8.0	24.86	24.0	42.5	50.3	55.44	75.0
8	57.77	17.52	14.0	40.25	47.0	57.0	68.0	75.29	100.0
9	43.38	17.36	6.5	26.02	30.3	42.0	55.4	60.74	80.2
10	59.76	24.43	0.0	35.33	41.5	58.1	75.1	84.19	91.5
11	55.89	16.50	24.3	39.39	39.7	55.2	64.7	72.39	90.5
12	65.47	16.55	24.0	48.92	55.2	67.8	75.1	82.02	94.0
13	56.01	18.96	8.5	37.05	42.0	58.5	67.0	74.97	100.0
14	10.91	13.61	0.0	-2.70	0.0	8.8	17.5	24.52	47.2
15	48.50	18.93	8.8	29.57	34.0	50.7	58.7	67.43	91.8
16	23.07	11.99	0.0	11.08	16.0	17.5	31.5	34.15	56.0
17	37.02	18.29	15.0	18.73	22.5	32.0	49.0	55.31	75.0
18	34.49	14.31	10.0	20.18	20.0	32.0	48.0	48.80	66.0
19	38.54	23.13	0.0	15.41	16.0	41.2	57.2	61.67	77.0
20	52.31	16.61	18.5	36.15	37.7	54.3	67.6	68.92	76.8
21	41.25	22.37	0.0	18.88	24.8	41.3	58.5	60.13	83.4
22	47.09	18.43	15.5	28.66	30.4	40.4	60.0	65.52	100.0
23	39.47	23.78	0.0	15.69	10.2	46.8	54.8	63.25	75.0
24	48.12	12.76	22.0	35.36	41.8	50.5	59.2	60.88	91.2
25	30.96	16.53	0.0	14.43	17.0	26.8	45.0	47.49	68.2

Two broad generalizations, therefore, may be drawn from the data presented in Table V-3. First, the data indicate that the schools are emphasizing a multiplicity of purposes, but, on the average, the mean operational scores were not extremely high for any single purpose. This may mean that the programs studied were attempting to attain more purposes than the structure for organization and operation of the programs permitted, and, thus, were tending to deal with some purposes somewhat superficially. Secondly, the data indicated that the schools varied widely in terms of the emphasis being placed on each purpose. This suggests that the schools differed widely not only in the purposes selected for emphasis, but, also, in the operational effort being made to attain each purpose. The information indicated that the programs were more heterogeneous than homogeneous in terms of the operational effort and emphasis being put forth to attain the twenty-five purposes of vocational agriculture.

Effort exerted at each level. Descriptive statistical information is presented in Table V-4 so that comparisons may be made among the several purposes and for the total list of purposes as to the relative amount of operational effort and emphasis which was being put forth to attain each of the twenty-five purposes of vocational agriculture. Table V-4 shows for each purpose the mean operational score (Column "a"), and for each of three levels of operation for each purpose the maximum score available to the school at each level (Column "c"), and the mean score obtained for each level of operation for each purpose (Column "d"). Then the mean score for each level of operation for each purpose (Column "d") was divided by the maximum score available to the school for each level (Column "c") to obtain a ratio of the mean score to the maximum score, and this ratio is shown in Column "e". The ratio then is a gauge of the extent to which the schools in the sample, on the average, received ratings to indicate the extensiveness of operation at each level. For comparative purposes, the ratios were transformed to figures comparable to the rating categories on Form 6. Since the schools were scored on a scale ranging from 0 to 4, this transformation was made by multiplying the ratio in Column "e" by four. This computation is equivalent to summing the ratings for each level of operation for each purpose and dividing by the number of schools in the sample. Lastly, in Column "g", the ratio of the mean score for each level to the mean operational score for a purpose (Column "d" divided by Column "a") is shown. The ratios actually represent the proportions of the mean operational score which is contributed by activity at each level of operation.

Again, the picture presented in Table V-4 is one characterized by variability. Observation of the data in Columns "e" and "f" reveals, for each level of operation as shown by the offset arrangement of the ratios and mean ratings, the variations among the

TABLE V-4

EXTENSIVENESS OF OPERATIONAL EMPHASIS FOR EACH OF THREE LEVELS OF OPERATION FOR EACH OF TWENTY-FIVE PURPOSES OF VOCATIONAL AGRICULTURE, SHOWING (1) RATIO BETWEEN MEAN SCORE TO MAXIMUM SCORE FOR EACH LEVEL, AND (2) RATIO OF MEAN SCORE FOR EACH LEVEL TO MEAN OPERATIONAL SCORE

	a	b	Column c	d	e	f	g
Purpose No.	Mean operational score	Level	Score for each level: Maximum score*	Score for each level: Mean score	Ratio of mean score to maximum score (d / c)	Mean rating**	Ratio of mean score to operational score (d / a)
1	47.16	A	34.0	22.39	.66	2.64	.47
		B	30.0	11.16	.37	1.48	.24
		C	36.0	13.61	.38	1.52	.29
2	52.83	A	32.0	25.36	.79	3.16	.48
		B	36.0	19.29	.54	2.16	.37
		C	32.0	8.18	.26	1.04	.15
3	54.56	A	28.0	18.18	.65	2.60	.33
		B	39.0	20.36	.52	2.08	.37
		C	33.0	16.02	.49	1.96	.30
4	63.32	A	28.0	23.21	.83	3.32	.37
		B	30.0	20.31	.68	2.72	.32
		C	42.0	19.80	.47	1.88	.31
5	53.90	A	26.0	18.83	.72	2.88	.35
		B	58.0	30.03	.52	2.08	.56
		C	16.0	5.04	.32	1.28	.09
6	49.51	A	32.0	23.21	.73	2.92	.47
		B	32.0	18.15	.57	2.28	.37
		C	36.0	8.15	.23	.92	.16
7	40.15	A	32.0	23.09	.72	2.88	.57
		B	37.0	13.59	.37	1.48	.34
		C	31.0	3.47	.11	.44	.09
8	57.77	A	28.0	19.78	.71	2.84	.34
		B	39.0	23.23	.60	2.40	.40
		C	33.0	14.77	.45	1.80	.26

*See Table V-1

**Based on maximum rating of 4.00, as used on Form 6. (See Form 6 in Appendix A.) Computed by multiplying 4.00 by the ratio in Column e.

TABLE V-4 (Continued)

	Column a	b	c	d	e	f	g
Purpose No.	Mean operational score	Level	Score for each level: Maximum score*	Score for each level: Mean score	Ratio of mean score to maximum score (d / c)	Mean rating**	Ratio of mean score to operational score (d / a)
9	43.38	A	47.0	28.45	.61	2.44	.66
		B	27.0	10.84	.40	1.60	.25
		C	26.0	4.09	.16	.64	.09
10	59.76	A	25.0	18.31	.73	2.92	.31
		B	41.0	26.52	.65	2.60	.44
		C	34.0	14.93	.44	1.76	.25
11	55.89	A	35.0	28.27	.81	3.24	.51
		B	27.0	15.87	.59	2.36	.28
		C	38.0	11.75	.31	1.24	.21
12	65.47	A	25.0	20.51	.82	3.24	.31
		B	46.0	30.19	.66	2.64	.46
		C	29.0	14.77	.51	2.04	.23
13	56.01	A	34.0	25.29	.74	2.96	.45
		B	34.0	18.04	.53	2.12	.32
		C	32.0	12.68	.40	1.60	.23
14	10.91	A	42.0	5.72	.14	.56	.52
		B	35.0	4.98	.14	.56	.46
		C	23.0	.21	.01	.04	.02
15	48.50	A	35.0	24.23	.69	2.76	.50
		B	33.0	13.01	.39	1.56	.27
		C	32.0	11.26	.35	1.40	.23
16	23.07	A	32.0	16.59	.52	2.08	.72
		B	30.0	3.47	.12	.48	.15
		C	38.0	3.01	.08	.32	.13
17	37.02	A	30.0	20.98	.70	2.80	.57
		B	34.0	8.85	.26	1.04	.24
		C	36.0	7.19	.20	.80	.19

TABLE V-4 (Continued)

	Column a	b	c	d	e	f	g
Purpose No.	Mean operational score	Level	Score for each level: Maximum score*	Score for each level: Mean score	Ratio of mean score to maximum score (d / c)	Mean rating**	Ratio of mean score to operational score (d / a)
18	34.49	A	40.0	22.20	.56	2.24	.64
		B	24.0	8.34	.35	1.40	.24
		C	36.0	3.95	.11	.44	.12
19	38.54	A	43.0	25.11	.58	2.32	.65
		B	32.0	12.49	.39	1.56	.33
		C	25.0	.94	.04	.16	.02
20	52.31	A	37.0	28.29	.76	3.04	.54
		B	29.0	15.07	.52	2.08	.29
		C	34.0	8.95	.26	1.04	.17
21	41.25	A	34.0	19.63	.58	2.32	.48
		B	31.0	11.66	.38	1.52	.28
		C	35.0	9.96	.28	1.12	.24
22	47.09	A	31.0	21.96	.71	2.84	.47
		B	29.0	13.85	.48	1.92	.29
		C	40.0	11.28	.28	1.12	.24
23	39.47	A	41.0	25.27	.62	2.48	.64
		B	32.0	12.88	.40	1.60	.33
		C	27.0	1.32	.05	.20	.03
24	48.12	A	44.0	32.19	.73	2.92	.67
		B	35.0	15.16	.43	1.72	.31
		C	21.0	.77	.04	.16	.02
25	30.96	A	34.0	19.66	.58	2.32	.63
		B	39.0	9.50	.24	.96	.31
		C	27.0	1.80	.07	.28	.06
Total (average)	46.06	A	33.96	22.27	.65	2.60	.48
		B	34.36	15.47	.45	1.80	.34
		C	31.68	8.32	.26	1.04	.18

25 purposes. The average ratios based on the total list of purposes was .65 for Level A, .45 for Level B, and .26 for Level C, and the average of the mean ratings was 2.60 for Level A, 1.80 for Level B, and 1.04 for Level C. The average of mean ratings indicated that the schools were operating at a relatively high degree of effectiveness for Level A type of activities, somewhat less effectively for Level B type of activities, and, on the average, operating to a limited extent with regard to Level C type of activities. But the range of mean ratings was relatively high. For Level A, the range was from .56 for Purpose No. 14 and 2.08 for Purpose No. 16 to a high of 3.32 for Purpose No. 4. For Level B type of activities the range was from .48 for Purpose No. 16 to 2.72 for Purpose No. 4. For Level C type of activities the range was from .04 for Purpose No. 14 to 2.04 for Purpose No. 12. Similar differences are observed in the ratio of the mean score for each level of operation to the mean operational score for each purpose, as presented in Column "g". The average contribution of the average score for Level A was 48 per cent, for Level B, 34 per cent, and for Level C, 18 per cent. But, for Level A, the contribution ranged from a low of 31 per cent for Purposes No. 10 and 12 to a high of 72 per cent for Purpose No. 16. The range in contribution for Level B scores was from a low of 15 per cent for Purpose No. 16 to a high of 46 per cent for Purposes No. 12 and No. 14. The per cent of the contribution to the mean operational score for Level C type of activities ranged from a low of 2 per cent for Purposes No. 19 and No. 24 to a high of 31 per cent for Purpose No. 4.

Summary

Taken together the data in Tables V-3 and V-4 show that (1) the vocational agriculture programs of the schools in the sample were delving into a multiplicity of areas, (2) that relative intensive effort was being made to attain the purpose for a number of the items, but (3) that for many purposes there was little activity beyond the study-discussion types of activities implied by Level A. The fact of variability, then, was a major finding in this part of the study. Operational scores varied widely not only among the list of 25 purposes, but, also, within each purpose. The greatest contribution was made to the total score by the scores attributable to activities at Level A, followed closely by the activities attributable to Level B, with, generally, the operations attributable to Level C having minor impact on the total score. However, again, there was considerable variation among the purposes with regard to relative amount of contribution and relative amount of activity at each of the three levels.

III. THE EXTENT TO WHICH SCHOOLS WERE OPERATING PROGRAMS OF VOCATIONAL AGRICULTURE IN AGREEMENT WITH THE RELATIVE IMPORTANCE OF THE PURPOSES

One of the basic questions posed in the initial design of the research project was to ascertain the extent to which schools are operating programs of vocational agriculture which manifest the social, economic, and technical trends identified in Part I of the study.[8] Data are now available in which the issues involved in this question may be examined. Scores assigned by Jury I to the 25 purpose items of vocational agriculture were presented in Chapter IV. Operational scores indicative of the relative operational effort and emphasis being put forth to attain each of the 25 purposes have been presented in the present chapter. Section III, therefore, examines the relationship between the purpose scores obtained in Chapter IV and the operational scores reported in Section II of the present chapter.

The Relationship Between Purpose Scores and Operational Scores

The relationship between the extent to which schools were operating programs of vocational agriculture in accordance with the relative importance of the purpose assigned by Jury I was analyzed both by computing regression equations and correlation coefficients. The regression data are presented in Table V-5, and the correlation data are presented in Table V-6.

The extent of agreement between the scores assigned by Jury I and the mean operational scores. The initial discussion of the agreement between the purpose scores and operational scores is centered on analyses by the regression equation, as shown in Table V-5. The computations presented in the present sub-section are based on the assumption that the true relationship between operational scores and purpose scores was linear. In performing the computations, the purpose scores were considered the independent variables and were designated the "X" scores. The operational scores were considered the dependent variables and were designated the "Y" scores. The regression equation, therefore, was $Y = a + bX$. All of the data needed in the computation of the regression equation are shown in Table V-5.

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[8] F. J. Woerdehoff, N. J. Nelson, and J. K. Coster, Vocational Education in Public Schools as Related to Social, Economic, and Technical Trends: Part I. The Analysis of Trends and Concepts (Studies in Education, No. 1, Lafayette, Indiana: Division of Education, Purdue University), 1960.

TABLE V-5

LINEAR REGRESSION DATA PRESENTED TO EXAMINE RELATIONSHIP BETWEEN IMPORTANCE OF PURPOSES OF VOCATIONAL AGRICULTURE, AS RATED BY JURY, AND MEAN OPERATIONAL SCORES, AS ASSIGNED TO SCHOOLS

Purpose	Purpose Scores Assigned by Jury "X"		Operational Scores "Y"		Predicted and Differential Values of "Y"		
No.	Rank	Score	Rank	Score	Y*	Y-Y*	P
12	17	695	1	65.47	43.32	22.15	.05
10	16	698	3	59.76	43.65	16.11	NS
8	9	751	4	57.77	49.46	8.31	NS
15	22	667	12	48.50	40.25	8.25	NS
24	21	672	13	48.12	40.80	7.32	NS
3	12	742	7	54.56	48.47	6.09	NS
1	19	676	14	47.16	41.24	5.92	NS
4	1	828	2	63.32	57.90	5.42	NS
5	11	743	8	53.90	48.58	5.32	NS
11	4	783	6	55.89	52.77	3.12	NS
21	23	648	17	41.25	38.17	3.08	NS
13	3	785	5	56.01	53.19	2.82	NS
9	20	674	16	43.38	41.02	2.36	NS
2	7.5	761	9	52.83	50.56	2.27	NS
6	7.5	761	11	49.51	50.56	- 1.05	NS
20	2	790	10	52.31	53.73	- 1.42	NS
22	10	745	15	47.09	48.80	- 1.71	NS
7	14	709	18	40.15	44.85	- 4.70	NS
16	25	557	24	23.07	28.20	- 5.13	NS
17	18	685	21	37.02	42.23	- 5.21	NS
19	13	725	20	38.54	46.61	- 8.07	NS
18	15	703	22	34.49	44.20	- 9.71	NS
23	5	781	19	39.47	52.75	-13.28	NS
25	6	776	23	30.96	52.20	-21.24	NS
14	24	645	25	10.91	37.84	-26.93	.05

X =	18000	Y =	1151.44
X^2 =	13046888	Y^2 =	56843.53
$\bar{X}$ =	720.0	$\bar{Y}$ =	46.06
		XY =	838862.40

$a = -32.8544$; $b = .1096$; $S_b = .037$; $\underline{t} = 2.96$; $r^2 = .28$

*$Y = a + bX = -32.85 - .1096X$

TABLE V-6

RANK ORDER AND PRODUCT MOMENT CORRELATIONS BETWEEN MEAN OPERATIONAL SCORES ASSIGNED TO VOCATIONAL AGRICULTURE PROGRAMS AND SCORES FOR PURPOSE IMPORTANCE ASSIGNED BY TOTAL JURY AND SUB-JURIES

Mean Operational Scores			Scores Assigned by Total Jury and Sub-Juries							
			Groups							
	Purpose		Total Jury		Adminis.		Curriculum		Agri. Educ.	
Rank	Score	No.	Rank	Score	Rank	Score	Rank	Score	Rank	Score
1	65.47	12	17	695	16	208	17	212	15	275
2	63.32	4	1	828	1	244	2	245	1	339
3	59.76	10	16	698	8	224	22.5	191	14	283
4	57.77	8	9	751	5	227	13	225	10	299
5	56.01	13	3	785	4	229	11.5	228	4	328
6	55.89	11	4	783	8	224	8.5	233	5	326
7	54.56	3	12	742	12	213	6	236	11	293
8	53.90	5	11	743	8	224	20	205	7	314
9	52.83	2	7.5	761	3	233	4	240	12	288
10	52.31	20	2	790	10	221	5	239	3	330
11	49.51	6	7.5	761	6	225	7	234	9	302
12	48.50	15	22	667	21.5	196	18.5	210	20	261
13	48.12	24	21	672	24	189	15.5	221	19	262
14	47.16	1	19	676	19.5	199	14	224	24	253
15	47.09	22	10	745	13	212	11.5	228	8	305
16	43.38	9	20	674	14.5	209	18.5	210	22.5	255
17	41.25	21	23	648	19.5	199	22.5	191	21	258
18	40.15	7	14	709	17	206	8.5	233	16	270
19	39.47	23	5	781	11	220	3	241	6	320
20	38.54	19	13	725	18	202	24	189	2	334
21	37.02	17	18	685	21.5	196	15.5	221	17	268
22	34.49	18	15	703	14.5	209	10	230	18	264
23	30.96	25	6	776	2	243	1	247	13	286
24	23.07	16	25	557	25	170	25	181	25	206
25	10.91	14	24	645	23	190	21	200	22.5	255

	Correlation Coefficients	
	Rank order	Product moment
Mean operational scores - Total jury	.44	.53
Mean operational scores - Administration	.55	.55
Mean operational scores - Curriculum	.19	.30
Mean operational scores - Agricultural Education	.44	.52

To determine the extent to which the coefficient "b" functioned effectively in the prediction of the "Y" scores, a "t" test was performed to test the hypothesis that the true value of "b" was zero. The formula was $t = (.1096-0) / .037$, or 2.96 with 23 degrees of freedom, the hypothesis that the true value of "b" was zero was rejected at the 1 per cent level of significance. This finding indicates that there was a significant relationship between the mean operational scores and the purpose scores. The extent of the relationship was analyzed further by computing the value of r^2, the sum of squares around the regression line accounted for by regression divided by the total sum of squares of scores around the regression line. The value of r^2 was 1076.89 / 3810.97, or .28. This means that 28 per cent of the variation in scores around the regression line was attributable to regression. Thus the data indicate that there was a significant relationship between the purpose scores and the mean operational scores, but that only slightly more than one-fourth of the variation in scores around the regression line was attributable to regression.

Analyses of variation for individual purpose items. Detailed analyses were made of the regression data to ascertain the deviation for each "Y" score from the regression line. Using the regression equation $Y = -32.85 + .1096X$, a predicted "Y" score was computed for each of the "X" scores. Then the differentials between the obtained "Y" scores, or the mean operational scores, and the predicted "Y" scored were computed. The purpose items in Table V-5 actually are listed in order of the values of the differential scores between the obtained "Y's" and the predicted "Y's". The differentials ranged from +22.15 to -26.93. A positive differential indicated that greater emphasis was being placed upon attaining the purpose than the relative importance of the purpose, as determined by the purpose score, would indicate. A negative differential indicated that less emphasis was being placed operationally upon attaining the purpose than the purpose would tend to indicate. The greatest deviations were observed for Purposes Nos. 12, 10, 23, 24, and 14. Purpose No. 12, "to assist students in developing non-mechanical skills . . . involved in farm production and improvement," was ranked first according to operational scores and seventeenth according to purpose scores. Purpose No. 10, "to assist students in developing mechanical skills . . . involved in farm improvement and maintenance," was ranked third according to operational scores and sixteenth according to purpose scores. Thus the positive differentials of greatest magnitude pertain to purposes related to the attainment of relatively simple farm skills. If it may be presumed that the purpose scores assigned by Jury I manifested a relative importance of the purposes in terms of the contemporary social, economic, and technical conditions and trends, then it would appear that the purposes of vocational agriculture, related to attaining relatively simple farm skills, should be accorded less emphasis in the future than was being practiced at the time of the study.

At the other extreme, the results of the application of the regression equation indicated that the schools were placing less emphasis upon the attainment of Purposes Nos. 23, 25, and 14 than the relative importance of these purposes as judged by Jury I indicated should be accorded to these items. Purpose No. 23, "to assist persons established in farming to adjust to changing occupational conditions in farming," was ranked nineteenth according to operational scores and fifth according to purpose scores. Purpose No. 25, "to assist students in developing an understanding of scientific knowledge, concepts, and methods related to agriculture," was ranked twenty-third according to operational scores and sixth according to purpose scores. Purpose No. 14, "to assist out-of-school youth and adults enter into and/or become more effectively established in farm-related occupations," was ranked twenty-fifth according to operational scores and twenty-furth according to purpose scores. Thus there was marked disagreement in the ranks assigned to two of these items whereas, for the third item, the ranks agreed, but the mean operational score was much lower than the predicted operational score, based on the regression equation, would indicate. Here the data tended to indicate that more attention should be given in planning future programs of vocational agriculture to helping established farmers adjust to and keep abreast of changing conditions in agriculture, to modify programs of instruction so that the scientific aspects of agriculture receive more emphasis in the instructional program, and to becoming cognizant of the relative importance of assisting persons in preparing for and entering into occupations related to farming.

To determine whether the extreme differentials shown in Table V-5 deviate significantly from a fitted relationship, a "t" test was performed to test the significance of the deviation.[9] Tests were made only of the extreme cases. Values of t exceeding 2.069, the critical value of t at the 5 per cent level of significance with 23 degrees of freedom, were obtained for only two items, Purposes Nos. 12 and 14. The differentials for these two purposes, therefore, were found to deviate significantly from a fitted relationship at the 5 per cent level of significance. The remaining 23 differentials did not deviate significantly from the fitted relationship. This finding, in

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[9] In this instance

$$t = \frac{Y_i - \ddot{Y}_i}{\sqrt{\frac{SSE}{n-2}\left|1 - \frac{1}{n} - \frac{(Y_i - \bar{X})^2}{X^2 - \frac{(X)^2}{n}}\right|}},$$

where SSE is the error sum of squares, or the total sum of squares of deviations around the regression line minus the sum of squares attributable to regression (SSE = TSS - SSR). Cf. M.H. Quenoille, Associated Measurements (New York: Academic Press, Inc., 1952), p. 66.

itself, tended to substantiate further the positive relationship between the mean operational scores and the purpose scores.

Agreement between operational scores and purpose scores assigned by three sub-juries. Product moment and rank order correlation coefficients were computed between the operational scores and the total jury scores and between the operational scores and the scores assigned by the three sub-juries which comprised Jury I. The three sub-juries included specialists in school administration, curriculum construction, and agricultural education. The results of these correlation coefficients are shown in Table V-6. The rank order correlation coefficient between the ranks assigned by the jury and the ranks based on mean operational scores was .44 and the product moment correlation was .53. The rank order correlation coefficient between the scores assigned by the administration sub-jury and the mean operational scores was .55, and the product moment correlation coefficient also was .55. The rank order correlation coefficient between the scores assigned by the curriculum sub-jury and the mean operational scores was .19, and the product moment correlation coefficient was .30. The rank order correlation coefficient between the scores assigned by the agricultural education sub-jury and the mean operational scores was .54, and the product moment correlation coefficient was .52. Thus the data show that the operational scores correlate more highly with the scores of the administration and agriculture education sub-juries than with the curriculum sub-jury. For 25 pairs of ratings, the product moment correlation coefficient obtained between the administration sub-jury and the agricultural education sub-jury and the mean operational scores differed significantly from zero at the 1 per cent level of significance, whereas for the curriculum sub-jury, the correlation coefficient, .30, did not differ significantly from zero.

Further analyses of the data were made to ascertain if the correlation coefficients differed significantly. In testing the hypotheses that the three correlation coefficients, .55, .30, and .52, were drawn from a common population, a chi-square value of 1.23 was obtained. This value was not significant for rejection of the hypothesis at the 5 per cent level of significance with 2 degrees of freedom; consequently, it could be concluded that these correlation coefficients were drawn from a common population. Another test was made to ascertain if the correlation coefficient of .55, obtained for the school administration sub-jury, differed significantly from the correlation coefficient of .30 obtained for the curriculum sub-jury. The hypothesis that the difference was zero was not rejected. Thus it was concluded that the differences in the correlation coefficients among the three sub-juries could have occurred by chance, and that, actually, the hypothesis of the substantial agreement was tenable.

Summary of regression and correlation analyses. Summarized, the statistical tests applied to ascertain whether the programs of vocational agriculture in the 41 school sample were emphasizing and attaining

the purposes in the order in which they were scored and ranked by the jury indicated: (1) that a significant relationship existed between the mean operational scores and the purpose scores based on (a) the rejection of the hypothesis of no relationship between dependent and independent variables; and (b) an r^2 value of .28 indicating that 28 per cent of the variation of scores around the regression line was attributable to regression; (2) that of the 25 purposes studied, in only two instances did the mean operational score differ significantly from the predicted score based on a fitted relationship, and that in these instances the deviation was significant only at the 5 per cent level of significance; and (3) that there was substantial agreement among the correlation of the three sub-juries with the mean operational scores. Thus it may be concluded that the programs of vocational agriculture included in the sample were tending to emphasize the purposes in the order in which they were scored and ranked by Jury I. But it was not possible to establish an extremely high relationship, especially in light of the fact that slightly more than one-fourth of the deviations of scores about the regression line was attributable to regression.

Agreement Between Purpose Scores Assigned by School Raters and Operational Scores

The present sub-section deals with the question of whether schools were tending to emphasize the purposes, as indicated by mean operational scores, in the order in which the purposes were scored and ranked by school raters in terms of acceptance as goals of the vocational agriculture programs in the 41 schools.[10] The correlation and regression data discussed in this sub-section are presented in Table V-7.

The extent of agreement between scores assigned by school raters and mean operational scores. The extent of agreement between the scores assigned by school raters and the mean operational scores was determined by the regression equation. The regression equation was $Y = a + bX$, or $Y = -27.91 + .5017X$. The effectiveness of "b" as a predictor of the "Y" scores was determined by a "t" test in which $t = (.5017 - 0) / .1116$, or 4.4955. Thus the hypothesis that the true value of "b" was zero was rejected at the .1 per cent level of significance. The proportion of the variation of scores around the regression line attributable to regression was determined by dividing the sum of squares attributable to regression, 1769.36, by the total sum of squares for variation around the regression line, 3810.97, for which a value of r^2 of .46 was obtained. Thus it was determined that 46 per cent of the variation of scores

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[10] Supra, p. 70

TABLE V-7

LINEAR REGRESSION AND CORRELATION DATA PRESENTED TO EXAMINE THE RELATIONSHIP BETWEEN SCORES ASSIGNED TO PURPOSES OF VOCATIONAL AGRICULTURE BY SCHOOL RATERS AND MEAN OPERATIONAL SCORES

Purpose	Purpose Scores (School Raters) "X"		Operational Scores "Y"		Predicted and Differential Values of "Y"		
No.	Rank	Score	Rank	Score	Y*	Y-Y	P
10	16	143	3	59.76	43.83	15.93	NS
12	5.5	159	1	65.47	51.86	13.61	NS
5	19	137	8	53.90	40.82	13.08	NS
21	24	116	17	41.25	30.29	10.96	NS
22	21.5	134	15	47.09	39.32	7.77	NS
13	8.5	155	5	56.01	49.85	6.16	NS
20	12	149	10	52.31	46.84	5.47	NS
15	16	143	12	48.50	43.83	4.67	NS
11	5.5	159	6	55.89	51.86	4.03	NS
6	13	148	11	49.51	46.34	3.17	NS
4	2.5	176	2	63.32	60.39	2.93	NS
7	21.5	134	18	40.15	39.32	.83	NS
3	4	164	7	54.56	54.37	.19	NS
23	20	135	19	39.47	39.82	- .35	NS
24	8.5	155	13	48.12	49.85	- 1.73	NS
8	2.5	176	4	57.77	60.39	- 2.62	NS
1	7	158	14	47.13	51.36	- 4.23	NS
19	18	141	20	38.54	42.83	- 4.29	NS
16	25	112	24	23.07	28.28	- 5.21	NS
9	11	153	16	43.38	48.85	- 5.47	NS
17	14	144	21	37.02	44.33	- 7.31	NS
2	1	177	9	52.83	60.89	- 8.06	NS
18	16	143	22	34.49	43.83	- 9.34	NS
25	10	154	23	30.96	49.35	-18.39	NS
14	23	121	25	10.91	32.80	-21.89	.05
ΣX =		3686			ΣY = 1151.44		
ΣX^2 =		550494			ΣY^2 = 56843.54		
$\bar{X}$ =		147.44			$\bar{Y}$ = 46.06		
					ΣXY = 173295.04		

a = -27.91; b = .5017: S_b = .1116; t = 4.5
Product moment r = .68; r^2 = .46; Rank order rho = -.66

*Y = a + bX = -27.91 + .5017X

around the regression line was attributable to regression. The product moment correlation between the operational scores and the scores assigned by school raters for purpose acceptance was computed as .68, and the rank order correlation coefficient was .66, according to data in Table V-7. The data, therefore, support the conclusion that the schools were exerting operational effort and emphasis to attain purposes in relation to the extent to which the purposes were accepted as goals in the vocational agriculture programs of the school. Moreover, these data demonstrate that schools were in closer agreement with regard to operational effort and emphasis put forth to attain purposes, based on the extent to which the purposes were accepted as goals of the programs, than with the scores assigned to purposes by Jury I.

Analyses of variations for individual purpose items. Using the regression equation, $Y = -27.91 + .5017X$, a predicted "Y" score was computed for each of the "X" scores. The differentials between the obtained "Y" scores or the mean operational scores and the predicted "Y" scores were computed. The differentials are shown in Table V-7, listed in order of magnitude of the differentials between the obtained "Y's" and the predicted "Y's".

The data in Table V-7 show that the largest differentials were obtained for Purposes Nos.10, 12, 5, 21, 25, and 14. For the first four purposes, Purposes Nos.10, No. 12, No. 5, and No. 21, the data indicate that the schools were exerting more effort to attain these purposes than the relative importance of the purpose based on the extent of acceptance as goals of the school's vocational agriculture program would indicate. Purpose No. 10, "to assist students in developing mechanical skills . . . involved in farm improvement and maintenance," was ranked sixteenth according to purpose acceptance scores but was ranked third according to operational scores. Purpose No. 12, "to assist students in developing non-mechanical skills . . . involved in farm production and improvement," was ranked 5.5 according to purpose scores but was ranked first according to operational scores. Purpose No. 5, "to assist students in developing the ability to maintain, operate, and adjust farm power, machinery, and equipment," was ranked nineteenth according to acceptance but was ranked eighth according to operational scores. Purpose No. 21, "to assist high school students in obtaining employment in appropriate agricultural occupations," was ranked twenty-fourth according to purpose acceptance but was ranked seventeenth according to operational scores. Thus the data show that the schools were tending to place more effort on attaining purposes related to the attainment of skills than the extent to which these skills were accepted as goals in the vocational agriculture programs of the schools would indicate.

At the other extreme, Purpose No. 25, "to assist students in developing an understanding of scientific knowledge, concepts, and methods related to agriculture," ranked tenth according to purpose acceptance and twenty-third according to operational scores. Purpose No. 14, "to assist out-of-school youth and adults enter into and/or become more effectively established in farm-related occupations," ranked twenty-third according to purpose acceptance and twenty-fifth according to operational scores. Here it would appear that the schools did not score as high operationally for purposes pertaining to scientific aspects of agriculture and pertaining to helping persons becoming established in farm-related occupations as the relative importance of these purposes based on acceptance as goals in the vocational agriculture programs of the schools would indicate.

Again a statistical treatment was applied to determine the extent to which the differentials deviated from a fitted relationship.[11] In only one instance did the obtained value excede 2.069, the critical value of t at the 5 per cent level of significance with 23 degrees of freedom. The differential for Purpose No. 14 deviated significantly from the fitted regression at the 5 per cent level of significance. The remaining 24 observations did not deviate significantly from the fitted regression line.

The extent of agreement between the acceptance of individual purposes and operational scores. To examine further the relationship between the extent to which each purpose was accepted as a goal in the vocational agriculture program of the school and the operational scores assigned to the schools by the research staff, a series of null hypotheses was set up to the effect that operational scores were independent of the quantitative rating assigned to the schools on Form 5.[12] The results of these tests of significance are shown in Table V-8. Table V-8 also shows the frequency distribution indicating the number of schools accepting the purpose for each response category, namely, (1) no extent, (2) limited extent, (3) moderate extent, (4) considerable extent, (5) very great extent.

Examination of the data in Table V-8 indicates that the mean operational scores tended to increase as the numerical response category increased. Of 25 hypotheses tested, 11 were rejected, four at the 5 per cent level of significance, three at the 1 per cent level, and four at the .1 per cent level. The results of these tests of significance, then, substantiate the agreement between the operational scores and the acceptance of purposes which was established through the analyses of regression and correlation

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[11] See supra, p. 111

[12] See infra, pp. A - 18 ff.

TABLE V-8

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN ACCEPTANCE OF PURPOSE ITEMS BY SCHOOL AND MEAN OPERATIONAL SCORES FOR TWENTY-FIVE PURPOSES OF VOCATIONAL AGRICULTURE

Purpose		Extent of Purpose Acceptance										
		No extent (1)		Limited extent (2)		Moderate extent (3)		Considerable extent (4)		Very great extent (5)		
No.	Rank	N	Means	N	Means	N	Means	N	Means	N	Means	P
1	19	0	—	1	50.0	12	36.8	20	46.7	8	63.6	.01
2	7.5	0	—	0	—	5	51.8	18	50.8	18	55.2	NS
3	12	1	33.3	2	18.1	7	52.2	17	57.9	14	58.4	.05
4	1	0	—	0	—	4	43.0	21	65.5	16	65.5	NS
5	11	1	6.5	13	35.8	8	52.1	9	62.9	10	75.6	.001
6	7.5	0	—	2	24.0	17	44.5	17	53.7	5	62.4	NS
7	14	3	30.0	5	43.5	16	38.2	12	41.1	5	46.8	NS
8	9	0	—	0	—	6	46.6	17	52.9	18	66.1	.05
9	20	0	—	4	40.2	13	41.6	14	44.2	10	45.9	NS
10	16	1	0	9	41.7	9	51.9	13	66.9	9	82.1	.001
11	4	0	—	3	41.5	9	48.3	19	60.8	10	57.7	NS
12	17	0	—	1	81.3	12	63.1	19	63.9	9	70.2	NS
13	3	0	—	2	25.3	12	62.7	20	55.8	7	55.5	NS
14	24	6	0	9	10.5	9	19.3	15	11.3	2	4.4	NS
15	22	0	—	8	35.1	10	50.6	18	55.5	5	40.7	NS
16	25	2	8.0	18	22.3	11	25.3	9	22.6	1	39.0	NS
17	18	0	—	4	20.9	16	27.8	17	44.3	4	59.3	.001
18	15	0	—	5	21.6	16	34.6	15	35.7	5	43.4	NS
19	13	4	0	6	29.4	8	43.4	14	45.5	9	46.7	.01
20	2	0	—	3	30.8	14	51.9	19	53.7	5	61.3	.05
21	23	3	11.3	1.5	34.9	11	38.6	10	58.3	2	62.9	.001
22	10	1	15.5	10	39.5	11	48.5	15	51.7	4	52.6	NS
23	5	2	0	9	30.3	9	38.6	17	45.3	4	57.1	.01
24	21	2	30.8	4	43.4	8	43.7	14	52.9	13	49.8	NS
25	6	0	—	1	45.0	15	21.3	18	38.1	7	31.2	.05

data.

Summary. The data presented in the present sub-section of Section III support the conclusion that the schools were operating programs of vocational agriculture, as measured by mean operational scores assigned to each purpose, in substantial agreement with the extent to which the purposes were accepted as goals of the vocational agriculture programs of the schools. The magnitude of the regression coefficient indicated that there was practically no possibility of non-relationship, the value of r^2 indicated that 46 per cent of the variations of scores could be attributed to regression, the analyses of deviations from the fitted regression line indicated that only one purpose item deviated significantly from the regression line and this deviation was significant at the 5 per cent level of significance; and F tests applied to test the hypothesis that operational scores were independent of the quantitative response categories indicating acceptance of purposes as goals in the programs were rejected for eleven of the twenty-five purposes.

Summary of Section

With regard to providing an answer to the question posed at the beginning of the section -- to what extent are programs of vocational agriculture currently in existence operating so as to manifest the contemporary social, economic, and technical trends previously identified in the research -- analyses of relationship indicated that there was a positive relationship between program operation, as measured by mean operational scores, and the order in which the purposes were scored and ranked by Jury I, based on the contemporary design of vocational education.[13] The relationship, though significant, was not high, with 28 per cent of the variations in scores around the regression line being accounted for by regression. When the operational scores were compared with the scores assigned to purpose items in terms of acceptance of purposes as goals of the vocational agriculture programs of the schools, a much higher relationship was obtained. Here 46 per cent of the variation of scores was found to be attributable to regression. Thus, as might be expected, there was greater agreement between the operational emphasis and effort being put forth to attain purposes (as described quantitatively by the mean operational scores for each purpose) and the extent to which purposes were scored and ranked as goals in the schools' vocational program, than between the operational scores and the relative importance of the purposes as scored and ranked by Jury I.

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[13] See supra, pp. 24-25

IV. THE RELATIONSHIP BETWEEN OPERATIONAL SCORES FOR TWENTY-FIVE PURPOSES OF VOCATIONAL AGRICULTURE AND SELECTED VARIABLES

Section IV presents the results of tests of the following five null hypotheses:

1. There is no difference in the mean operational score for each of the twenty-five purposes of vocational agriculture when schools are grouped according to three size groups.

2. There is no difference in mean operational scores for twenty-five purposes of vocational agriculture when schools are grouped according to whether schools offer vocational agriculture programs only or both vocational agriculture and industrial arts.

3. There is no difference in mean operational scores for twenty-five purposes of vocational agriculture when schools are grouped according to geographical location.

4. There is no difference in mean operational scores for twenty-five purposes of vocational agriculture when schools are grouped according to assessed valuation per enrolled pupil.

5. There is no difference between the operational scores for twenty-five purposes of vocational agriculture when schools are grouped according to four classifications as designated by the State Department of Public Instruction.

The first two hypotheses were originally postulated in Chapter III, and were used as guides in stratifying the sample of schools. Schools were stratified according to geographical location in order to maximize the dispersion of schools within the state as was outlined in Chapter III. The hypothesis pertaining to wealth and the hypothesis pertaining to classification of departments were tested in order to identify additional variables which potentially were believed to be related to variation in operational scores. The sub-sections of Section IV present the report of the 125 null hypotheses tested.

The Relationship Between School Size and Operational Scores

It was indicated in Chapter III that three discrete size groups were selected, and samples were drawn from schools in these size groups so that the relationship between school size and operational scores could be analyzed as accurately as possible. The size groups were a small-size group, including schools enrolling from 100 to 150 students; a medium-size group, including schools enrolling from 300 to 450 students; and a large-size group,

consisting of schools enrolling 600 or more students.

The data in Table V-9 show that the mean operational scores of the schools in the large-size group tended to surpass the mean operational scores of the other two size groups. Actually, the operational scores for the large-size group were highest for 17 of the 25 purposes. The small schools scored highest for five purposes, and the medium-size schools scored highest for three purposes. The differences, however, were not sufficiently large to be statistically significant, except in two instances. The attending null hypothesis was rejected at the 1 per cent level for Purpose No. 6, and at the 5 per cent level for Purpose No. 21. The remaining 23 hypotheses were not rejected. On the basis of the data presented in Table V-8, it may be concluded that, although the operational scores generally were higher for the large-size grou a statistical trend was not established based on the results of tests of hypotheses by single classification analysis of variance.

The Relationship Between Program Offerings and Operational Scores

The issue involved in the series of statistical tests reported in the present sub-section pertains to the question of whether schools operate more effectively or less effectively when they attempt to offer one or two practical arts programs for boys. The null hypothesis was that operational scores are independent of whether the school offers vocational agriculture only or both vocational agriculture and industrial arts. The testing of the twenty-five hypotheses was restricted to the small-size group only, since this was the only size group in which there were a sufficient number of schools offering vocational agriculture programs only. The statistical tests were based on twenty-one schools, of which ten offered vocational agriculture only and eleven offered both vocational agriculture and industrial arts.

The results of tests of hypotheses, made by application of the single classification of analysis of variance, are shown in Table V-9. In each of the twenty-five instances, the null hypothesis was not rejected. Closer examination of the data indicates that there was no consistent pattern as to which are superior, the schools which offer vocational agriculture only or the schools that offer both vocational agriculture and industrial arts. Schools offering vocational agriculture only scored higher for fifteen of the twenty-five purposes whereas schools offering both vocational agriculture and industrial arts scored higher for ten of the twenty-five purposes. The data clearly indicated, therefore, that the extensiveness of program offerings in the practical arts area for boys was not a variable significantly related to variation in operational scores for the twenty-five purposes of vocational agriculture.

TABLE V-9

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN SIZE OF SCHOOL AND MEAN OPERATIONAL SCORES FOR TWENTY-FIVE PURPOSES OF VOCATIONAL AGRICULTURE

Purpose No.	Rank	Size of School: Small N = 21	Medium N = 12	Large N = 8	P
1	19	41.76	54.25	50.69	NS
2	7.5	51.14	52.25	58.13	NS
3	12	49.95	54.92	66.14	NS
4	1	65.45	61.54	60.38	NS
5	11	57.29	44.62	58.94	NS
6	7.5	47.05	41.58	67.86	.01
7	14	36.21	42.25	47.35	NS
8	9	55.48	56.69	65.41	NS
9	20	39.48	47.12	48.01	NS
10	16	65.76	46.99	63.14	NS
11	4	58.25	51.32	56.56	NS
12	7	61.89	68.38	70.53	NS
13	3	53.57	58.53	58.63	NS
14	24	11.12	10.57	6.35	NS
15	22	44.98	48.52	57.73	NS
16	25	22.19	25.71	21.44	NS
17	18	33.86	36.46	46.19	NS
18	15	30.81	38.33	38.38	NS
19	13	40.55	30.68	45.05	NS
20	2	52.59	48.27	57.63	NS
21	23	37.66	36.19	58.38	.05
22	10	46.22	41.99	57.04	NS
23	5	43.07	31.38	42.16	NS
24	21	46.82	47.17	52.96	NS
25	6	30.13	32.76	30.44	NS

TABLE V-10

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN WHETHER SMALL SCHOOLS OFFERED VOCATIONAL AGRICULTURE PROGRAMS ONLY OR BOTH VOCATIONAL AGRICULTURE AND INDUSTRIAL ARTS AND MEAN OPERATIONAL SCORES

Purpose No.	Rank	Program Offerings: Vocational Agriculture Only N = 10	Program Offerings: Both Vocational Agriculture and Industrial Arts N = 11	P
1	19	47.25	36.77	NS
2	7.5	50.80	51.45	NS
3	12	49.07	50.75	NS
4	1	64.05	66.73	NS
5	11	59.65	55.14	NS
6	7.5	45.80	48.18	NS
7	14	37.51	35.04	NS
8	9	58.23	52.97	NS
9	20	42.51	36.72	NS
10	16	70.97	61.03	NS
11	4	58.64	57.89	NS
12	7	64.33	59.66	NS
13	3	55.35	51.95	NS
14	24	14.07	8.45	NS
15	22	46.27	43.80	NS
16	25	22.45	21.95	NS
17	18	30.85	36.59	NS
18	15	32.20	29.55	NS
19	13	40.51	40.58	NS
20	2	53.10	52.13	NS
21	23	35.90	39.26	NS
22	10	45.52	46.85	NS
23	5	41.39	44.60	NS
24	21	44.76	48.69	NS
25	6	31.90	28.53	NS

The Relationship Between Geographical Location and Operational Scores

In order to maximize dispersion of the schools in the sample, and at the same time, to study the relationship between location in the state and effectiveness of operation of the programs of vocational agriculture, the sample was divided into four geographical sections. The sample of 41 schools included ten vocational agriculture programs in the North section, twelve in the North Central section, twelve in the South Central section, and seven in the South section. The North section of the state has a large number of industrial centers and is important agriculturally. The North and South Central sections include the rich corn belt area of Indiana. The South section is characterized by an undulating topography, which renders the land less productive from an agrarian point of view.

The mean operational scores for schools in each geographical location are shown in Table V-11. Table V-11 also shows the results of null hypotheses formulated to the effect that operational scores were independent of the section of the state in which the school was located. The data in Table V-11 indicate that, generally, the operational scores were lower for the schools in the South section than for the schools in the other three sections with hypotheses being rejected for five of the twenty-five purposes. The consistently low scores assigned to the schools in the South section tended to indicate that the schools in this section were exerting less effort to attain the purposes of vocational agriculture than the schools in the other three sections.

The Relationship Between Assessed Valuation Per Enrolled Pupil and Operational Scores

The extent to which the financial ability to support educational programs was a variable significantly related to variation in operational scores provided the basis for a series of twenty-five null hypotheses, tested and reported in Table V-12. To prepare the data for test by the single classification analysis of variance, the schools were grouped into two categories: (1) schools with assessed valuation per enrolled pupil in grades 1-12 of less than $7000.00 and (2) schools with assessed valuation per enrolled pupil of $7001.00 or more. There were twenty-one schools in the low valuation group and twenty schools in the high group. Observation of the data in Table V-12 indicates that the mean operational scores for the schools in the high group were consistently higher than the mean operational scores for the low group, with the high group receiving higher scores for twenty-three of the twenty-five purposes. Of the twenty-five hypotheses tested, seven hypotheses were rejected at the 5 per cent level of significance. Considering the consistent pattern of variation in the scores, and considering the fact that the null hypotheses were rejected for seven of the twenty-five items, it seems reasonable to conclude that assessed

TABLE V-11

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN LOCATION OF SCHOOL IN STATE AND MEAN OPERATIONAL SCORES OF TWENTY-FIVE PURPOSES OF VOCATIONAL AGRICULTURE

Purpose No.	Rank	Location in State: North N = 10	North central N = 12	South central N = 12	South N = 7	P
1	19	45.10	47.00	50.87	44.00	NS
2	7.5	55.90	52.58	51.33	51.43	NS
3	12	56.81	48.64	62.86	47.29	NS
4	1	67.30	67.71	57.58	59.93	.05
5	11	64.65	59.29	50.33	35.43	NS
6	7.5	55.60	52.91	47.58	38.29	NS
7	14	42.30	39.19	43.42	33.13	NS
8	9	62.69	54.25	62.38	48.87	NS
9	20	52.43	35.94	48.38	34.63	.05
10	16	68.05	69.50	55.11	39.17	.05
11	4	56.58	52.06	63.52	48.41	NS
12	7	69.76	69.50	67.47	49.03	.05
13	3	62.80	55.21	60.07	40.71	NS
14	24	20.02	10.08	9.77	1.26	.05
15	22	43.14	48.37	49.90	53.99	NS
16	25	23.30	26.92	17.42	25.86	NS
17	18	43.85	38.71	37.25	24.00	NS
18	15	34.00	31.67	35.75	37.86	NS
19	13	41.59	37.78	47.55	20.03	NS
20	2	57.45	53.62	52.25	42.81	NS
21	23	43.42	36.89	43.61	41.57	NS
22	10	51.13	43.09	48.65	45.51	NS
23	5	36.95	44.93	13.18	22.60	NS
24	21	50.68	45.56	52.25	41.77	NS
25	6	31.54	33.77	30.12	26.77	NS

TABLE V-12

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN ASSESSED VALUATION PER ENROLLED PUPIL AND MEAN OPERATIONAL SCORES OF TWENTY-FIVE PURPOSES OF VOCATIONAL AGRICULTURE

Purpose No.	Rank	Assessed Valuation Per Enrolled Pupil $7000.00 and under N = 21	$7001.00 and over N = 20	P
1	19	46.43	47.93	NS
2	7.5	47.19	58.75	.05
3	12	52.49	56.74	NS
4	1	59.32	67.30	NS
5	11	47.26	60.88	NS
6	7.5	43.29	56.04	.05
7	14	34.79	45.79	.05
8	9	56.52	59.08	NS
9	20	41.62	45.22	NS
10	16	54.73	65.02	NS
11	4	53.84	58.04	NS
12	7	59.95	71.27	.05
13	3	51.14	61.12	NS
14	24	9.75	12.12	NS
15	22	48.93	48.05	NS
16	25	22.83	22.33	NS
17	18	30.31	44.08	.05
18	15	32.48	36.60	NS
19	13	35.58	41.65	NS
20	2	46.41	58.50	.05
21	23	36.81	45.91	NS
22	10	40.90	53.60	.05
23	5	35.91	43.21	NS
24	21	46.35	49.98	NS
25	6	26.42	35.72	NS

valuation per enrolled student was a variable related significantly to the operational effort and emphasis being put forth to attain purposes of vocational agriculture.

The Relationship Between Classification of Department and Operational Scores

The fifth and last variable studied in Section IV was included as a technique for validating operational scores. Vocational agriculture departments in the state of Indiana annually are awarded a classification based upon a number of considerations. Attention is given to the availability of shop equipment and facilities, the offering of programs instruction for out-of-school youth and/or adults, the operation of an effective program in the local chapter of Future Farmers of America, the extensiveness of the directed experience program, the adequacy of library resources, and the presence of an adequate course of study. Of the 41 schools in the sample, in the year 1958-59, nine departments were classified as "first class", eighteen departments were classified as "upper" second class, thirteen departments were classified as "lower" second class, and one department was classified as "limited approval."

The mean operational scores for each of the twenty-five purposes of vocational agriculture are shown in Table V-13. Examination of the data in Table V-13 reveals a consistent decline in the magnitude of the operational scores in agreement with classification assigned to the department. Of the 25 hypotheses tested, 13 were rejected, eight at the 5 per cent level of significance, and five at the 1 per cent level. Of special importance is the fact that of the 13 hypotheses rejected, the corresponding purposes relate very closely to the criteria considered in classifying departments.[14] This was especially true of the purposes for which the corresponding hypotheses were rejected at the 1 per cent level. Purposes Nos. 5 and 10 both pertain to the development of abilities related to farm mechanics, both necessitate special facilities to attain the purposes, and both purpose items are considered in the classification of departments. Departmental classifications also are based on the organization of programs of instruction for out-of-school youth and adults, to which Purposes Nos. 19 and 23 pertain.

Detailed examination of the data in Table V-13 tended to confirm the adequacy of assigning operational scores to schools, in that the magnitude of the scores for each classification was in close agreement with the ratings assigned independently by representatives of the Indiana State Department of Public Instruction.

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[14] Division of Agricultural Education, "An Application for Approval of a First Class Department of Vocational Agriculture". (Mimeographed Form, State Department of Public Instruction, Indianapolis, Indiana).

TABLE V-13

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN CLASSIFICATION OF DEPARTMENTS OF VOCATIONAL AGRICULTURE AND MEAN OPERATIONAL AGGREGATES

		Classification of Department				
		First class	Second Class Upper	Lower	Limited approval	
No.	Rank	N = 9	N = 18	N = 13	N = 1	P
1	19	50.56	43.25	51.27	33.50	NS
2	7.5	59.22	55.00	46.23	42.00	NS
3	12	67.78	51.62	52.61	14.00	.05
4	1	74.28	65.86	53.50	46.50	.05
5	11	70.67	57.78	40.27	10.50	.01
6	7.5	52.44	56.44	40.46	16.00	.05
7	14	45.08	39.86	39.02	16.00	NS
8	9	69.62	55.94	54.93	21.00	.05
9	20	51.44	40.42	44.73	6.50	NS
10	16	76.27	63.41	46.25	21.00	.01
11	4	62.96	57.21	49.91	46.40	NS
12	7	76.62	64.29	62.09	30.30	.05
13	3	68.77	52.69	55.42	8.50	.01
14	24	12.32	11.19	10.37	0	NS
15	22	57.89	50.91	37.88	58.70	NS
16	25	23.22	21.11	25.62	24.00	NS
17	18	42.28	38.64	32.27	22.50	NS
18	15	40.89	31.00	35.08	0	NS
19	13	56.72	45.22	19.66	0	.01
20	2	63.43	52.79	46.54	0	.05
21	23	45.46	45.81	33.29	24.80	NS
22	10	57.96	50.69	35.90	30.00	.05
23	5	54.37	47.38	21.25	0	.01
24	21	55.93	49.52	41.93	33.00	.05
25	6	39.57	28.84	29.02	17.00	NS

Summary

On the basis of the tests of the 125 null hypotheses postulated in Section IV, it may be noted in summary that (1) variation in operational scores were in substantial agreement with classification of departments as awarded by the Indiana State Department of Public Instruction, (2) size of school and program offerings, that is, whether the schools were in the small, medium, or large-size groups, and whether the small schools offered vocational agriculture only or both vocational agriculture and industrial arts, generally, were not significantly related to variation in mean operational scores, although the schools in the large-size group received slightly higher scores than the schools in the other two size groups for a majority of the purpose items, and (3) there were indications that the financial ability to support education was a variable related to variation in operational scores, as indicated both by variations of scores when schools were classified according to assessed valuation per enrolled pupil and by the observation that schools in the South section of the state, where the financial ability to support education, generally, is lower than in the other three sections of the state, received lower scores on a large majority of the purpose items.

SUMMARY OF CHAPTER V

Chapter V dealt with (1) the derivation of an operational score for each of twenty-five purposes of vocational agriculture for the 41 school sample, and (2) the analysis of the relationship between the magnitude of the operational scores and the magnitude of the purpose scores. The operational scores expressed in quantitative terms the relative amount of operational emphasis and effort being exerted to attain each purpose. The purpose scores, as assigned by a jury of educational specialists, were assumed to be a quantitative expression of the relative importance of purpose items which were based on the results of the analysis of social data reported in Part I of the study. In addition, analyses were made to ascertain the relationship between the extent to which purposes were accepted as goals of the vocational agriculture programs and the relative amount of operational emphasis and effort being exerted to attain each purpose. Then, too, operational scores were studied to identify potential variables significantly related to variations in operational scores.

The derivation of operational scores involved a quadruplicate process: (1) For each of the twenty-five purposes, a series of three statements was prepared which described activities appropriate for attaining purposes at three levels of operation. (2) A jury of educational specialists--including specialists in school administration, curriculum construction, and agricultural education--

rated the educational value of each level of operation for each purpose, and from these ratings, a maximum operational score available to the school for each level was derived. (3) The 41 schools in the sample were visited, teachers of vocational agriculture were interviewed and their activities observed, and a rating was assigned to each teacher which was indicative of the extent of operational emphasis and effort being exerted to attain each purpose at each of three levels of operation. (4) The ratings assigned to each level were translated into scores, based on the relative importance of the operations at each level as determined by the jury, and the quantitative values for each level were summed to procure an operational score for each purpose for each school.

The findings in Chapter V may be summarized as follows:

1. There was substantial agreement among the specialists in school administration, curriculum construction, and agricultural education, who comprised Jury III, with regard to the relative educational value of the three levels of operation for each purpose.

2. Although the relative value of levels of operations varied among the twenty-five purposes, the ratings of the jury indicated that a school operating at Level A, which, generally, implied study-discussion types of activities, should receive, on the average, an operational score not exceeding 35 points out of a possible score of 100. To be truly effective in exerting operational effort to attain a purpose, then, the judgment of the jury members indicated that students should be provided with the opportunity to participate in learning activities which are characteristic of the experience unit concepts.

3. The schools in the sample were tending to emphasize a multiplicity of purposes, with relative intensive effort being exerted to attain only a few purposes, and with a consequent tendency to emphasize a number of purposes somewhat superficially. Schools varied extensively, not only in mean operational scores among purposes, but, also, within each purpose with regard to the amount of effort being exerted to attain the purpose. The data also denoted that when the mean operational scores were partialled to determine the relative contribution of scores at each of three levels of activity, the greatest contribution to the total score came from operations at Level A, followed by Level B.

4. The data indicated that the schools in the sample were tending to emphasize the purposes in the order in which they were scored and ranked by Jury I to the extent that the regression coefficient was significantly larger than zero and that 28 per cent of the variation around the regression line was attributable to regression.

5. The data indicated that the schools were tending to emphasize the purposes in the order in which they were scored and ranked by school raters, in terms of acceptance as goals in the vocational agriculture programs of the schools, to the extent that the regression coefficient was significantly larger than zero, and that 46 per cent of the variation around the regression line was attributable to regression. Thus, the operations of the schools were directed more forcibly to attaining the purposes in the order in which they were scored and ranked by school raters for acceptance than in the order in which they were scored and ranked by the jury for importance; however, this trend was not statistically significant. (The hypothesis that the true difference between $\sqrt{.28}$ or .53 and $\sqrt{.46}$ or .68--the product moment correlation coefficient between the mean operational scores and (1) the purpose scores assigned by Jury I for importance and (2) the purpose scores assigned by the school raters for acceptance, respectively--was zero was not rejected.)

6. When schools were grouped according to selected classifications for four variables--size of school, program offerings, geographic location, and assessed valuation per enrolled pupil--it was found that neither the variable size nor the variable of whether schools were offering one or two practical arts programs for boys was related to variation in mean operational scores. But it was found that the variables, geographical location and assessed valuation per enrolled pupil, were related to variation in mean operational scores for a number of purpose items. Inasmuch as the schools in the South section, generally, received lower scores than the schools in the other three sections, and inasmuch as the schools in the South section, generally, have less wealth than Northern school corporations, it seemed reasonable to conclude that taxable wealth was definitely identified as a variable related to operational emphasis and effort.

7. There was evidence of substantial agreement between the classification of departments of vocational agriculture, as awarded by the Indiana State Department of Public Instruction, and the scores assigned by members of the research staff to describe quantitatively the relative amount of operational effort and emphasis being put forth to attain the twenty-five purposes of vocational agriculture.

CHAPTER VI

THE DERIVATION AND ANALYSES OF OPERATIONAL AGGREGATES FOR PROGRAMS OF VOCATIONAL AGRICULTURE

The operational aggregate is a measure accorded an educational program where the operational procedures have been linked with acceptable program objectives. Operational aggregates were determined for programs of vocational agriculture in forty-one Indiana high schools using a bidimensional approach to educational appraisal.[1] The operational aggregate for a program represents a quantitative description of the program when the scores assigned a program for operational emphasis and effort are adjusted in accordance with the value of the purposes for which particular operations apply.[2]

Chapter VI reports and summarizes findings involving operational aggregates for the forty-one programs of vocational agriculture. Major attention is directed toward identifying the relationship of selected school and community variables and resource ratings to operational aggregates.

I. THE STATUS OF VOCATIONAL AGRICULTURE BASED ON OPERATIONAL AGGREGATES

Operation is an action word that denotes some form of teaching-learning activity being applied to achieve a task. The nature of the operations relating to the instructional program is contingent on the processes and patterns which define and describe the emphasis and effort being expended to achieve a particular task. Logic would

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[1] J.K. Coster, N.J. Nelson, and F.J. Woerdehoff, A Bidimensional Approach to Educational Appraisal; (Lafayette, Indiana: Purdue University, Division of Education, 1960).

[2] The specific objectives of the project treated in Chapter VI, as were listed in Chapter I, are:

(8). To obtain for each teacher and each school in the sample a quantitative measure of the operational effort and emphasis put forth to attain the purposes of vocational agriculture, modified in terms of the relative importance of the particular purpose.

(9). To ascertain the relationship between operational effort and emphasis put forth to attain purposes, modified in terms of the relative importance of the purpose, and (1) selected school and community variables, and (2) selected material and human resource variables.

support the premise that if operations are worthy of performing, they should be performed equally well for all tasks. Although the nature of the processes and patterns which define operations may vary for different tasks, the maximum value accorded the different operations should not vary. However, the same logic would not apply to purpose values because it is reasonable to presume that certain purposes may be more important than certain other purposes. The primacy of orientation attributed to a specific task suggests that the purpose value act as a counterpoise to operational processes. The process-purpose concept applied to appraisal of educational programs replaces the single dimension of equal value with the bi-dimensional approach which holds maximum operational values constant but qualifies actual operations in relation to the importance of the purpose. It follows that the ultimate value of an instructional activity directed toward achieving a purpose is a function of the importance of the purpose.

The components of the operational aggregate are the sums of the products of purpose factors and operational factors determined for each purpose. Purpose factors were derived for each of 25 purposes of vocational agriculture programs by dividing each purpose score by 828,[3] the score accorded the highest ranking purpose, multiplying the quotient by 100 and rounding to the nearest whole number. Purpose factors and purpose scores for 25 purposes of vocational agriculture are shown in Table VI-1.

Each operational score obtained for a program was converted to an operational factor by multiplying the operational score by the corresponding purpose factor and dividing the product by 100. By this process, therefore, the maximum value accorded a program for operations was qualified by the relative importance of the purpose factor. Where a program received an operational score of 100, in accordance with the scoring procedure described in Section II of Chapter V,[4] the operational factor was the same as the corresponding purpose factor. When, however, scores less than 100 were assigned to programs for operational effort and emphasis, the operational scores were adjusted to take into account the relative importance of the purpose. For example, if an operational score of 50 were assigned to a school for Purpose No. 10, the operational factor would be computed by multiplying 50 by 84, the purpose factor, and dividing the product by 100. In this example, the operational factor would be 42.

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[3] See Table IV-1, supra, p 61

[4] See supra, pp. 99-106

TABLE VI - 1

PURPOSE FACTORS AND PURPOSE SCORES FOR TWENTY-FIVE PURPOSES OF VOCATIONAL AGRICULTURE ARRANGED IN RANK ORDER

Purpose			
Rank	Number	Score	Factor
1	4	828	100
2	20	790	95
3	13	785	95
4	11	783	95
5	23	781	94
6	25	776	94
7.5	6	761	92
7.5	2	761	92
9	8	751	91
10	22	745	90
11	5	743	90
12	3	742	90
13	19	725	88
14	7	709	86
15	18	703	85
16	10	698	84
17	12	693	84
18	17	685	83
19	1	676	82
20	9	674	81
21	24	672	81
22	15	667	81
23	21	648	78
24	14	645	78
25	16	557	67

With operational factors and purpose factors available, operational aggregates for each school in the sample were computed by multiplying each purpose factor by the corresponding operational factor and summing the products for the 25 purposes.[5] Table VI-2 shows the operational aggregates for 41 programs of vocational agriculture, with the aggregates rounded to the nearest 1000. Included also are the normalized scores which were obtained by translating the operational aggregate for the program in each school to a T-score.[6]

Data reported in Table VI-2 which shows the T-score for each program in the 41 schools reveal tha. 68 per cent of the cases fall within $\pm$ 1 standard deviation from the mean of 50. The distribution is positively skewed with 22 per cent of the cases exceeding 1 standard deviation above the mean, and 10 per cent of the cases 1 standard deviation below the mean. The positive skewness of the distribution also is indicated directly from comparing the means of the operational aggregates, which is 896.34, with the median, which is a lower value, 874.

The operational aggregate for a program of vocational agriculture in a particular school as used herein is a relative measure. In that no attempt w s made to determine standards for operational aggregates which define either excellence or acceptability or which assign scores giving tolerable program limits, the operational aggregate is considered a comparative measure. Operational aggregates for the programs of vocational agriculture in forty-one different high schools were calculated to provide a measure for ranking or otherwise classifying programs for comparative purposes. However, it should be emphasized that since both the purpose factor and the operational factor, which comprised the operational aggregate, were previously determined by the relative importance of the purpose

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[5] Exactly the same result could have been obtained by squaring the purpose factor and multiplying the square of the factor by the corresponding operational score, then summing the products. The ultimate effect by either procedure is the same: (1) the dispersion of scores is maximized, and (2) operational activity directed toward attaining the more important purposes results in a higher operational aggregate than operational activity directed toward attaining a purpose ranked lower in importance.

[6] Each T-unit is one-tenth of a standard deviation with the two constants, 50 and 10, representing the mean and standard deviation, respectively, of the set of scores. The operational aggregate minus the mean divided by 10 plus 50 equals the T-score in each case.

TABLE VI - 2

SCHOOLS ARRANGED IN RANK ORDER ACCORDING TO OPERATIONAL AGGREGATES AND T SCORES FOR FORTY-ONE PROGRAMS OF VOCATIONAL AGRICULTURE

Rank of school	Operational aggregate	T Score	Rank of school	Operational aggregate	T Score
1	1361	71.7	21	874	49.0
2	1332	70.3	22	873	48.9
3	1240	66.0	23	870	48.8
4	1191	63.8	24	849	47.8
5	1186	63.5	25	832	47.0
6	1160	62.3	26.5	831	46.9
7	1133	61.0	26.5	831	46.9
8	1123	60.6	28	814	46.2
9	1114	60.2	29	788	44.9
10	1062	57.7	30	782	44.7
11	1005	55.1	31	761	43.7
12	997	54.7	32	751	43.2
13	984	54.1	33	743	42.9
14	969	53.4	34	725	42.0
15	939	52.0	35	719	41.7
16	921	51.2	36	718	41.7
17	904	50.4	37	705	41.1
18	900	50.2	38	556	34.1
19	895	49.9	39	513	32.1
20	893	49.8	40	467	30.0
			41	437	28.6

Median - 874.00
Mean - 896.34
s - 214.22

item is relative to contemporary social data, the magnitude of the operational aggregate was assumed to be indicative of the extent to which the school was operating a program of vocational agriculture based on and related to the contemporary design for vocational education.

II. THE RELATIONSHIP OF OPERATIONAL AGGREGATES TO STATE CLASSIFICATIONS OF VOCATIONAL AGRICULTURE DEPARTMENTS

The nature of this research which introduced the bidimensional approach to educational appraisal as an appraisal technique presented difficulty in obtaining a valid criterion to use as an index in estimating whether the application of the technique accomplished the intended purpose. However, in that desirable standards for programs of vocational agriculture had been established as a guide to classification of departments by the State Department of Public Instruction of Indiana, the investigators elected to use the state classification of departments as the background against which operational aggregates could be compared.

A review of procedures employed by State officials to classify departments revealed many factors which condition the rating.[7] Further, it was recognized that the scope and breadth of knowledge of the many persons involved in analyzing departments and recommending classification improve the accuracy and quality of the value judgments. Therefore, it seemed reasonable to conclude that insofar as the bidimensional approach was designed to obtain a relative measure of an educational program, this measure should have a definite relationship with department classifications unless evidence to the contrary suggests major difference in intent between the bidimensional measure and the state department classification system. Despite direct evidence that the factors contributing to operational aggregates were major considerations in department classifications, and even knowing that many factors which determined operational aggregates were unstudied in classification, the intent in each case was quite similar. The innumerable factors investigated in the classification procedures also support the position that a positive relationship should exist. Thus, presumptive evidence can be secured by learning whether the differences between groups which on a priori grounds should differ, actually do differ.[8]

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[7] W.E. Wilson, Vocational Education in Agriculture in Indiana Schools, (Indianapolis: Department of Public Instruction, State of Indiana, 1959), pp. 1-22.

[8] For further elaboration of this validating procedure, see Q. McNemar, "Opinion Guage," Psychological Bulletin, 43: 289-324.

Data reported in Table VI-3 show the mean operational aggregates for schools grouped according to classification assigned the 41 schools by the Indiana State Board for Vocational Education. Included also is the result of the statistical test applied to determine relationship between operational aggregates and state classification of departments.

TABLE VI-3

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN CLASSIFICATIONS OF VOCATIONAL AGRICULTURE DEPARTMENTS AS AWARDED BY INDIANA STATE BOARD FOR VOCATIONAL EDUCATION AND MEAN OPERATIONAL AGGREGATES

Item	Classification Groupings: First Class N	First Class Means	Upper Second Class N	Upper Second Class Means	Lower Second Class N	Lower Second Class Means	Limited Approval N	Limited Approval Means	P
Classification of department	9	1074.67	18	917.06	13	779.54	1	437.00	.001

The single classification analysis of variance was applied to test a null hypothesis to the effect that operational aggregates assigned to 41 programs of vocational agriculture were independent of the level of State classification for these departments. The hypothesis was rejected at the .1 per cent level of significance. The result exhibits the substantial agreement evident between operational aggregates and department classifications. Observation of the data found in Table VI-3 shows that the mean operational aggregate of 1074. 67 was high and was the mean of the nine first class departments in the sample. As the mean operational aggregates decreased, so did the department classifications. The hazard of the observational interview bias vitiating these findings was minimized by the fact that the teams conducting the operational interviews were not aware of the classifications of the various departments at the time they conducted the investigation.

The results of this test of significance tended to substantiate to a marked degree the adequacy of the scoring procedure, and enhanced the validity of further analyses performed with these data.

III. THE RELATIONSHIP BETWEEN COMMUNITY VARIABLES AND OPERATIONAL AGGREGATES

The march of events in American society and the tenor of the times have contributed to an awareness of community factors which increasingly are being identified and credited as cause and effect variables accounting for differences in educational operations and programs. To appraise the prospects of establishing whether programs of vocational agriculture were dependent on a selected number of social and economic factors which tended to vary among communities, selected socio-economic variables were used to establish groups for the purpose of making comparisons with operational aggregates. Community variables relating to size, geographic location, and population classification were used to establish groups for testing whether such sociological variables tended to influence operational aggregates. Community variables relating to financial ability and financial effort to support education were used to establish groups for testing whether such economic variables tended to influence operational aggregates for programs of vocational agriculture.

Before progressing with the report of the tests of relationship between selected variables and operational aggregates, attention should be directed to the criteria reported previously which were used as the basis of selecting the sample of schools. For vocational agriculture programs, it was hypothesized: (1) That operational aggregates were related to size of school, and (2) That operational aggregates were related to whether schools offered both vocational agriculture and industrial arts programs of vocational agriculture programs only.[9] In each instance the attending null hypothesis was not rejected.[10] Thus, except for reporting the results of these tests in appropriate section of Chapter VI, the entire group of 41 schools was treated as a sample of programs of vocational agriculture in Indiana public high schools.

Relationship of School Size to Operational Aggregates

Size of schools has been the factor which often, it is said, sets the limits of the quality and quantity dimensions in educational programs. The logic of this statement plus an abundance of evidence tends to substantiate this viewpoint when made in relation to certain specific aspects of the educational programs. A broad generalization to the effect that size is universally and inclusively a factor affecting quality and quantity of educational programs seems unwise and

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[9] Supra, p.

[10] Infra, p. 139 and 154

unwarranted. For this reason, size was to be tested rather than generalized about in studying programs of vocational agriculture.

To ascertain whether there was evidence that school size was a factor related to the size of operational aggregates, null hypotheses to the effect that the operational aggregates for programs of vocational agriculture were independent of size of school were tested. The analysis of variance technique was the procedure employed to make the tests. Table VI-4 summarizes data and reports the results of the tests.

TABLE VI-4

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN SIZE OF SCHOOLS OFFERING VOCATIONAL AGRICULTURE AND OPERATIONAL AGGREGATES, WHEN SCHOOLS ARE GROUPED ACCORDING TO SIZE

Classification	Size Groups: Small N	Small Means	Medium N	Medium Means	Large N	Large Means	P
All schools in sample	21	878.00	12	861.83	8	996.25	NS
Schools offering both vocational agriculture and industrial education	11	864.55	12	861.86	8	996.25	NS

As shown in Table VI-4, hypotheses were tested separately for the programs in the 41 school sample and for the programs in the 31 schools that offered programs in both vocational agriculture and industrial education. It may be observed by referring to the probability column P of the table that both hypotheses were tenable. On the basis of this sample of schools, of this method of grouping, of this operational measure, and of using this particular statistical technique, it follows that school size was not shown to relate to size of operational aggregate at the 5 per cent level of significance, which was the lowest level determined to be acceptable to the investigators.

These findings, which related school size to operational aggregates, need elaboration so that the qualifications that should be considered before making interpretations from these data may be recognized. The study was structured to draw a stratified sample of schools that offered vocational agriculture using three discrete size groups; with high schools enrolling between 100 to 150 pupils considered small, 300 to 450 pupils considered medium, and 600 or more pupils considered large. This sampling procedure did not make it possible for schools of all sizes to have an equal chance of appearing in the sample. In that approximately 26 per cent of the high schools in Indiana enroll fewer than 100 pupils in grades 9 through 12, this fact very possibly could cause distributions such that the mean operational aggregates for these schools would increase the variance to the extent that tests of difference would become statistically significant. The sampling procedure was described in detail in Chapter III,[11] and, on the basis of the sample selected, the null hypothesis pertaining to size was not rejected.

Relationship of Geographic Location to Operational Aggregates

It is not uncommon to find cited in the literature reference to the major differences evident among the several states with regard to such variables as literacy, level of educational attainment, and the like. It is not unreasonable to assume that certain differences within a state might be equally as great as are differences among the states. To determine whether a major difference did exist in operational aggregates for programs of vocational agriculture depending on whether the schools were located in the North, North Central, South Central, or South section of the state was investigated. The null hypothesis that operational aggregates for school programs were independent of geographic location of the schools was tested using the single classification analysis of variance. Table VI-5 reports the result of the test.

The probability column (P) of Table VI-5 shows that the variations evident in the means of the operational aggregate were not great enough to be statistically significant. Thus, the null hypothesis was tenable.

Relationship of Operational Aggregates to the Rural-Urban Classification of the Student Body

Socially, the rural resident and the urban resident are involved in a mutual cross-cultural transposition movement which is tending to erase the unique cultural features which in the past stereotyped the farmer and the city dweller. Aiding and abetting this movement are the changes in educational structure coming about

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[11] Supra, pp. 43-44.

TABLE VI-5

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN LOCATION OF SCHOOLS IN STATE AND MEAN OPERATIONAL AGGREGATES FOR VOCATIONAL AGRICULTURE, WHEN SCHOOLS ARE GROUPED ACCORDING TO GEOGRAPHICAL AREA

Item	Geographical Area: North N	North Means	North Central N	North Central Means	South Central N	South Central Means	South N	South Means	P
Geographical area	10	962.80	12	901.83	12	928.25	7	737.29	NS

through school district reorganization programs. Although programs of vocational agriculture had been designed and still aim to serve the rural student, an increasing number of the programs are being found in high schools located in urban centers where rural residents attend school. To discover whether there was evidence that the rural-urban orientation of the high school student body influenced program operations in agriculture, a comparison was made between operational aggregates and rural-urban classification of the student body in the 41 school sample. These data are reported in Table VI-6.

TABLE VI-6

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN RURAL-URBAN POPULATION CHARACTERISTICS OF STUDENT BODY AND MEAN OPERATIONAL SCORES FOR VOCATIONAL AGRICULTURE

Item	Population Groupings: Completely Rural N	Completely Rural Means	Highly Rural N	Highly Rural Means	Half Rural, Half Urban N	Half Rural, Half Urban Means	Highly Urban N	Highly Urban Means	P
Characteristic of population	4	810.00	14	842.07	22	934.41	2	928.00	NS

A null hypothesis to the effect that operational aggregates for programs of vocational agriculture were independent of the rural-urban

classification of the high school student body was found to be tenable. In other words, this test did not uncover any evidence to support the contention sometimes presented that agriculture programs will suffer in urban schools. Most interesting, the slight differences in means of the operational aggregates as reported in Table VI-6 were higher for the schools which had urban orientation.

Relationship of Operational Aggregates to Financial Ability

Financial ability may be defined as the potential capability to secure funds based on measures of capacity. Along with school size, differences in financial ability to support education is a major issue debated to explain strengths and weaknesses in educational programs. To examine whether the relationship between operational aggregates and financial ability might submit some evidence to support one position or the other with regard to the influence of financial ability to school operations, a null hypothesis to the effect that operational aggregates were independent of financial ability was tested. Table VI-7 reports the results of the test.

TABLE VI-7

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN FINANCIAL ABILITY TO SUPPORT EDUCATION, AND MEAN OPERATIONAL AGGREGATES FOR VOCATIONAL AGRICULTURE, WHEN SCHOOLS ARE GROUPED ACCORDING TO FINANCIAL ABILITY GROUPINGS

	Assessed Valuation Per Enrolled Pupil					
	Less than $5000.00		$5000.00 8999.00		$9000.00 and over	
Item	N	Means	N	Means	N	Means	P
Financial ability to support education	6	769.17	23	846.83	12	1054.83	.01

The null hypothesis tested with the data found in Table VI-7 was rejected at the 1 per cent level of significance. The data indicate a significant relationship between financial ability as measured by assessed valuation per enrolled pupil and operational aggregates of programs of vocational agriculture. Whereas the mean of the operational aggregates of the low financial ability group ($5,000 and under assessed valuation per resident pupil group) was

769.17, the mean for the high ability group ($9,000.00 and over group) was 1054.83.

These data submit evidence that the probability of finding high level operations as measured by operational aggregates for programs of vocational agriculture is proportionally greater where financial ability as measured by assessed valuation per resident pupil is greater for schools that would typify the population of the 41 school sample. However, these data do not warrant a generalization that would suggest a virtual impossibility for high level operations where financial ability was low, as subsequent data indicate.

Relationship of Operational Aggregates to Financial Effort

Financial effort in education may be defined as the measure of exertion made to support education. The financial structure which supports education in Indiana is such that local school districts must rely rather heavily on the property tax to secure revenues for educational costs. Considerable freedom is afforded local communities to go beyond the state minimum foundation requirement for education should they elect to do so. In the absence of adequate cost accounting specifically for programs of vocational agriculture and because instructional salaries represent the single, largest expenditure for school operations, it was reasoned that the relative variations of effort among schools could be guage quite adequately by studying salary differences. Table VI-8 reports the means of salary data and the results of tests which compared operational aggregates with financial effort based on salary differentials.

Operational aggregates compared to teachers' salaries. Based on intervals determined by contract salaries of vocational agriculture teachers, four different groups were established with the operational aggregate for a program falling into an appropriate salary group. These data are summarized in Table VI-8, Part A.

A null hypothesis to the effect that operational aggregates for programs of vocational agriculture were independent of financial effort to support these programs was tested. The probability column (P) in Table VI-8, Part A, indicates rejection of the hypothesis at the 5 per cent level of significance. On the basis of this measure, it can be concluded that financial effort is a factor that had substantial bearing on operational aggregates for the programs of vocational agriculture that were studied in the sample.

Operational aggregates compared to effort not influenced by state minimums. Salary data were available for vocational agriculture teachers which made it possible to partial out bias included in contracted salaries caused by state minimum salary requirements.

TABLE VI-8

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN SALARIES OF VOCATIONAL AGRICULTURE TEACHERS AND MEAN OPERATIONAL AGGREGATES, WHEN SCHOOLS ARE GROUPED ACCORDING TO APPROPRIATE CLASSIFICATION

PART A

Item	Contracted Salary Ranges								
	Less than $5500.00		$5500.00-5999.00		$6000.00-6499.00		$6500.00 and over		
	N	Means	N	Means	N	Means	N	Means	P
Salaries of teachers	8	697.63	10	923.70	9	1019.89	14	910.93	.05

PART B

Item	Ranges of Salaries in Excess of State Minimum								
	Less than $1000.00		$1000.00-1499.00		$1500.00-1999.00		$2000.00 and over		
	N	Means	N	Means	N	Means	N	Means	P
Differences between contracted salaries and state minimum	8	692.50	11	901.00	14	931.86	8	1047.65	.01

The minimum salary law in Indiana has provisions which determine the minimum salary for teachers according to educational training and teaching experience. Consequently, part of the variation among the schools in the effort measure used in Part A of Table VI-8 was due to training and experience differentials. Although it could be argued that the biases of more training and longer experience which result in higher salaries are factors allied to effort, it was reasoned that circumstances such as tenure and community ties might be the controlling forces rather than free exertion of financial effort to select and to retain teachers with higher qualifications.

Having available information which made possible the subtraction of the minimum salary requirement from the contracted salary made it possible to obtain a salary variable which was presumed to be more truly representative of financial effort than were contracted salaries. Data found in Table VI-8, Part B summarize findings using the groupings based on differences between contracted and state minimum salaries as the measure of financial effort.

It can be observed from the table that the null hypothesis to the effect that operational aggregates were independent of salary differences as a measure of effort was rejected at the 1 per cent level of significance. This finding reinforced what previously was found to be true for salaries as summarized in Part A of Table VI-8. Observation of the mean of the operational aggregates in the table for Part B show slightly more pronounced mean differences than was true for Part A.

At this point it could be summarized that evidence was disclosed to support the position that operations of programs in vocational agriculture as measured in this study for the 41 school sample were influenced significantly by both the financial ability and the financial effort of the school districts represented. An unanswered concern suggested by these findings was whether there was an inter-relationship between financial ability and financial effort which would help answer questions aiming to discover whether financial effort can help offset difference in financial ability. This problem is considered in the section which follows.

Relationship of Operational Aggregates to Financial Ability-Effort Variables

A pertinent concern referred to in the preceding section was whether financial effort without financial ability or financial ability without financial effort might offset each other as variables influencing program operations. Table VI-9 reports data used to check the inter-relationship of ability and effort to operational aggregates.

After analyzing basic data on assessed valuations per resident pupil and on salary differences of agriculture teachers, appropriate groupings were developed for financial ability and within each of the three ability groups appropriate sub-groupings representing low effort and high effort were developed. As shown in Table VI-9, operational aggregates for the 41 schools were distributed in the appropriate ability groups and the appropriate effort sub-groups. These data were used to test four different null hypotheses relating to various interaction alternatives. The results of the tests are summarized immediately below the table. It may be observed that two hypotheses were rejected while two others were found to be tenable.

The two null hypotheses to the effect that operational aggregates were independent of ability-effort groupings and were independent of whether high-effort or low-effort was made to support the programs were rejected at the 1 per cent level of confidence. The findings of these tests for these data indicate, first, that a significant difference did exist in the operational aggregates among the ability-effort groupings and, secondly, that a significant difference did exist in the operational aggregates between the 18 low-effort schools and the 23 high-effort schools. Observation of the data that apply to the aforesaid tests reveals a consistent pattern for the interrelationship of operational aggregates to ability-effort variables. In no case was the mean of the operational aggregates of low-effort groups as large as the mean of the operational aggregates for high-effort groups regardless of the financial ability groupings. And in no case, within the low-effort only or high-effort only groups, were the means of the operational aggregates for the low-ability group higher than for middle-ability group nor was the middle-ability group mean higher than the mean for the high-ability group.

Although the means of operational aggregates in either the low- or high-effort sub-groups increased as ability increased, the two null hypotheses to the effect that differences in operational aggregates were independent of ability groups were tenable. The tests of these null hypotheses, which were not rejected at the accepted level of significance, would not support the premise that differences in financial ability alone could be considered a significant variable related to marked discrepancies in operational aggregates.

For the data found in Table VI-9 and the statistical tests made with these data, it could be concluded that financial effort was a key factor and highly related with operation of programs of vocational agriculture in the 41 school sample.

The analyses made thus far, using the single classification analysis of variance technique, presented statistical evidence relative to differentiation of sources of variation. However, a

TABLE VI - 9

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN THE FINANCIAL EFFORT EXERTED BY SCHOOL DISTRICTS TO SUPPORT PROGRAMS OF VOCATIONAL AGRICULTURE, AND MEAN OPERATIONAL AGGREGATES, WHEN SCHOOLS ARE GROUPED ACCORDING TO FINANCIAL ABILITY TO SUPPORT EDUCATION

Operational Aggregates of Schools in Six Financial Ability-Effort Groupings					
Assessed Valuation Per Resident Pupil					
Less than $6000.00		$6000.00 to $8999.00		$9000.00 or over	
Low effort	High effort	Low effort	High effort	Low effort	High effort
437	705	467	556	745	725
513	719	718	751	782	984
814	895	831	761	788	1186
831	900	874	873	832	1240
849	997	893	904	870	1332
	1062		939	921	1361
	1114		969	1005	
			1123	1191	
			1133		
			1160		
Sums	3444	6392	3783	9169	7134	6828
N	5	7	5	10	8	6
Means	688.80	913.14	756.60	916.90	891.75	1138.00

Tests of significance:

Among six ability-effort groups - - - - - - d.f. = 5, 35 ... P < .01
Among three low-effort groups - - - - - - - d.f. = 2, 15 ... P > .05
Among three high-effort groups- - - - - - - d.f. = 2, 22 ... P > .05
Between three low-effort groups
and three high-effort groups- - - - - - - d.f. = 2, 39 ... P < .01

Mean of 18 low-effort schools- - - - - - - - - 793.83
Mean of 23 high-effort schools - - - - - - - - 973.43

more fundamental problem is to differentiate the variation and to identify each contributing variable to its source. With this problem in mind, further analyses were made using the double classification analysis of variance technique. To determine whether the differences in the means of operational aggregates between the low and high financial effort groups was influenced by the second variable, financial ability, the following hypotheses were tested: (1) that the operational aggregate means of the high and low financial effort groups are equal, (2) that the operational aggregate means of the high, medium, and low financial ability groups are equal, and (3) that the interaction between financial ability and financial effort is not significantly different from zero. The data used to test the hypotheses are summarized and the test results reported in Table VI-10.

Specifically, the problem was to identify the differential effects of three levels of financial ability upon operational aggregates for programs of vocational agriculture of schools classified according to two levels of financial effort. First, the hypothesis for interaction was found to be tenable, that is, the interaction was not significantly different from zero. Thus, the result of joint effect of financial ability on financial effort was found to be minimal. This being true, it may be concluded that financial effort was not found to be dependent upon financial ability.

The hypothesis that the operational aggregate means of the high and low financial effort groups are equal was rejected at the 1 per cent level of significance. There was a significant difference between the operational aggregate means; with the mean of the high effort group the largest. Hence, the observed difference was a real difference, not traceable to financial ability, and, further, would be due to chance in not more than one instance out of 100.

There also was a major difference found at the 5 per cent level of significance when the second hypothesis that the operational aggregate means of the financial ability groups are equal, was tested. Here it may be observed that the operational aggregate mean of the high financial ability group was larger than the means of either the medium or low financial ability groups.

In summary, evidence was disclosed to show that financial effort was a source of variation highly related to differences in operations of vocational agriculture programs; with high operations tending to be associated with high effort and low operations tending to be associated with low effort. Then, too, financial ability was a source of variation in program operations. Here, again, it was found that high ability tended to be associated with high operations, medium ability with medium operations, and low ability with low operations. The extent to which the first variable, financial effort, was influenced by the second variable, financial ability,

TABLE VI-10

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP AMONG OPERATIONAL AGGREGATES FOR PROGRAMS OF VOCATIONAL AGRICULTURE AND THE FINANCIAL ABILITY, AND THE FINANCIAL EFFORT TO SUPPORT THESE PROGRAMS

Operations of Vocational Agriculture Programs

Financial Ability	Financial Effort		Average Means
	High Effort	Low Effort	
High	1138.00	891.75	1014.88
Medium	916.90	756.60	836.75
Low	913.14	688.80	800.97
Average Means	989.35	779.05	

Source of Variance*	df	Sum of Squares	Mean Squares	F	P
Effort	1	425926	425926	12.30	.01
Ability	2	344123	172061	4.97	.05
Interaction	2	13339	6669	1	NS
Error	35	1211625	34624		

*Statistical treatment: Double classification analysi of variance.

was not very pronounced. Thus, these two financial variables tended to operate independently of each other as sources of variation in operations of vocational agriculture programs. In a sense, this means that, on one hand, effort can compensate for ability, and on the other hand, ability can compensate for effort. However, further insight into the problem, as revealed by an examination of the means, reported in Table VI-10, tends to indicate that differences in financial effort made to support operations of vocational agriculture programs was a variable contributing more to operational differences than were differences in financial ability.

IV. THE RELATIONSHIP BETWEEN SCHOOL ORGANIZATION VARIABLES AND OPERATIONAL AGGREGATES

It was hypothesized that organization variables within a school might be related to differences in the operation of instructional programs. Therefore, school organization information was collected for the purpose of testing specific hypotheses involving school organization variables and operational aggregates for the programs of vocational agriculture in the 41 school sample. The organization variables selected for study in this aspect of the research included (1) school membership in the North Central Association of Colleges and Secondary Schools, (2) type of administrative structure for vocational education, (3) availability of guidance personnel, and (4) curriculum organization pertaining to Industrial Education.[12]

Relationship of Operational Aggregates to North Central Membership

The schools that were members of the North Central Association of Colleges and Secondary Schools and those not members were compared to determine whether this fact was related to operational aggregates for the programs of vocational agriculture in the 41 school sample. Table VI-11 shows the means of the operational aggregates for the 20 schools affiliated and the 21 schools not affiliated with this accrediting agency. The null hypothesis tested with these data was that operational aggregates for the 41 agriculture programs were independent of membership in the North Central Association.

The statistical test revealed that the hypothesis could not be rejected at the chosen level of significance. The tenability of the hypothesis suggests that this test did not disclose statistical

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[12] See Form 2 of Appendix A, which is a reproduction of the General Information Survey used to gather general school and community data.

evidence to support the position that membership in the North Central Association is a school factor highly related to the operation of agriculture programs. The result of this test should be viewed in light of the fact that with the exception of being or not being a member no other variable was controlled in the grouping. For example, the schools in the sample for the most part had been members of the association for many years which would not account for more recent changes in procedures and techniques in accrediting standards if this was believed to be an important factor. It should be noted also that the mean of the 20 member schools was 960.90 compared with the mean of 634.86 for the non-member schools.

TABLE VI-11

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN WHETHER SCHOOLS ARE MEMBERS OF NORTH CENTRAL ASSOCIATION OF COLLEGES AND SECONDARY SCHOOLS AND MEAN OPERATIONAL AGGREGATES FOR VOCATIONAL AGRICULTURE

	Membership in Association				
	Yes		No		P
	N	Means	N	Means	
Membership in North Central Association	20	960.90	21	634.86	NS

Relationship of Operational Aggregates to Supervisory Structure

In recent years there has been a trend in the organizational structure of schools to provide personnel with administrative assignments which make them accountable for certain special activities in the school program. This practice has become quite prevalent in vocational education programs in the large school systems. Data were collected to determine how widespread this practice was in the schools that had programs of vocational agriculture and to check whether the practice had a significant bearing on the program operations as measured by the operational aggregates. Table VI-12 summarizes the data collected and reports the result of the null hypothesis tested to the effect that operational aggregate measures were not dependent on whether vocational directors were provided.

TABLE VI-12

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN TYPES OF SUPERVISORY ASSISTANCE AVAILABLE TO VOCATIONAL AGRICULTURE TEACHERS AND MEAN OPERATIONAL AGGREGATES FOR VOCATIONAL AGRICULTURE

Item	Supervisory Classifications: Principal Only N	Means	Principal and Vocational Director N	Means	P
Type of supervisory assistance	35	898.49	4	881.25	NS

It can be observed that in 39 of the 41 school sample where data were available, only four schools had vocational directors. The result of the test, when these few cases were compared with the 35 schools where the principals only were accountable for the programs, indicated that the hypothesis was tenable. In other words, this test disclosed no evidence that the presence or absence of vocational directors was a major factor in the operational aggregate measure of agriculture programs. Where vocational directors were employed, their orientation and administrative activities were largely allied to industrial education. Further, it was found that the nature of their assignments which included such responsibilities as overseeing adult education, filing reports, and handling student placement did not make any major provision for curriculum improvement activities.

It could be concluded that the limited number of vocational directors employed in schools offering vocational agriculture had no impact on the operational aggregates of the agriculture programs to the extent that marked differences were evident in these cases and not evident where principals only were accountable for the programs. In that operational aggregates were largely measures influenced by curriculum activities and the major activities engaged in by the directors were not curricular in nature, the finding was not surprising. Then, too, it was clearly evident that the employment of vocational directors was motivated by the industrial education program and the vocational directors were oriented to this program. It would appear in relation to the qualifications given that the employment of vocational directors in schools offering vocational

agriculture was not a pertinent school organization variable.

Relationship of Operational Aggregates to Guidance Structure

The impetus being given guidance programs and the societal trends which tend to support this movement suggest the need to study guidance structure as a school organization variable. Data reported in Table VI-13 summarize the findings which compared operational aggregates for programs of vocational agriculture according to whether special guidance personnel were available in the schools.

TABLE VI-13

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN EXTENT OF SPECIALIZED GUIDANCE PERSONNEL EMPLOYED, AND MEAN OPERATIONAL AGGREGATES FOR VOCATIONAL AGRICULTURE, WHEN SCHOOLS ARE GROUPED ACCORDING TO GUIDANCE PERSONNEL EMPLOYED

Item	Assigned Guidance Personnel: None N	None Means	Part Time N	Part Time Means	Full Time N	Full Time Means	P
Specialized guidance personnel	15	841.50	20	907.20	5	1023.40	NS

It may be observed that the null hypothesis tested to the effect that operational aggregates were independent of the personnel structure for guidance was found to be tenable. It could be defended, recognizing the limitations imposed on the data and within the context of the hypothesis tested, that operational aggregates for programs of vocational agriculture were not dependent on the presence of part-time or full-time guidance personnel being available in the school.

The pattern related to type of personnel and the corresponding size of the means of the operational aggregates shown in Table VI-13 should not be ignored. Availability of full-time personnel in guidance was limited to 12.5 per cent of the schools in the sample. The order of ascension of the means for the no-personnel group, the part-time personnel group and the full-time personnel group was in that order with the means being 841.50, 907.20, and 1023.40,

respectively.

Relationship of Operational Aggregates to Curriculum Organization

Whether motivated by the careful examination of societal trends or simply because neighboring schools were doing it, there have been a growing number of high schools making provision for industrial education programs. Particularly is this true in the smaller high schools. Accompanying the trend has been a growing concern among certain persons concerning the consequences of these program additions to existing programs. The issue tends to center on the effect industrial arts will have on vocational agriculture. To determine whether any statistical evidence could be found to support or deny charges growing out of agriculture versus industrial arts debates, the operational aggregate for the 21 small schools in the sample were compared when the schools were grouped as those having agriculture only and those having both programs.

The information reported in Table VI-14 was summarized from the data used to test the null hypothesis that operational aggregates for programs of vocational agriculture in small schools were independent of whether the schools offered both programs in agriculture and industrial arts or agriculture only. The hypothesis was found to be tenable. Thus, it could be defended in relation to the circumstances of the test situation that curriculum structure, which distinguishes among small schools on the basis of having or not having industrial arts along with vocational agriculture, did not appear to be a school organization variable significantly related to operational aggregate measures of agriculture programs.

TABLE VI-14

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN WHETHER SMALL SCHOOLS OFFER BOTH VOCATIONAL AGRICULTURE AND INDUSTRIAL EDUCATION PROGRAMS OR VOCATIONAL AGRICULTURE ONLY, AND MEAN OPERATIONAL AGGREGATES FOR VOCATIONAL AGRICULTURE

	Program Groups				
	Vocational Agriculture Only		Both Vocational Agriculture and Industrial Education		
Item	N	Means	N	Means	P
Type of program	10	892.80	11	864.55	NS

V. THE RELATIONSHIP BETWEEN EDUCATIONAL PROGRAM RESOURCES AND OPERATIONAL AGGREGATES

Resources may be defined as the actual and potential reserves, supplies, and available means for expediting, facilitating, and aiding a particular activity or set of activities. The nature of the educational program resources and the extent to which they were available were appraised for the programs of vocational agriculture in the 41 school sample.[13] Educational program resources were classified into two major sub-categories called material resources and human resources. The material resources included facilities, equipment, and other situational factors. The human resource included personal factors pertaining to the teaching staff. Within the context of the study, the material and human resources appraised were limited to or directly related to particular programs and teaching staffs. From this frame of reference, other more general resources, such as those included as community variables and school organization variables in the preceding sections, were considered as indirect resource factors and consequently assigned different classifications for the purpose of this investigation.

The teacher, the teaching tools, and the teaching environment provide the nucleus of the educational setting for instruction. This being true, it is important to investigate how these resource variables relate to program operations. This section of the chapter deals with various material and human resources as they relate to operational aggregates for programs of vocational agriculture.

Relationship of Operational Aggregates to Material Resources

Financial allocations earmarked for building and equipping schools have increased significantly over the years. A defense for these expenditures often has been the growing pupil population needing shelter and the obsolescence of many facilities and much of the equipment causing need for replacement. It is presumed, of course, that expenditures of this nature also are needed to meet operational efficiency of these programs. With the stated presumption in mind, the availability and suitability of material resources were appraised and compared with operational aggregates for programs of vocational agriculture in the 41 school sample. Material resources which included (1) facilities, (2) equipment, (3) teaching materials, (4) auxiliary services resources and (5) special school-community program resources were used to establish groupings into which operational aggregates

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[13] See Form 7 in Appendix A, which shows a reproduction of the resource appraisal instrument entitled Appraisal of Resources: Vocational Agriculture, infra, pp. A - 27 ff.

for agriculture programs were distributed for comparative purposes.

To prepare the resource data for classifications and statistical treatment, the data collected on Form 7, Appraisal of Resources: Vocational Agriculture were summarized on Form 7A,[14] Analysis of Resources: Vocational Agriculture. Form 7A, generally, provided for a seven point scale, with a score of "1" denoting that the resource was not available or not used, and a rating of "7" indicating that the resource was very adequate or used very extensively. Form 7A provided space for identifying data so that the information could be transferred to IBM cards, thereby facilitating the classification and analysis of data.

In transferring the data from Form 7 to Form 7A, generally a rating of "1" on Form 7 was recorded as "1" on Form 7A, a rating of "2" on Form 7 was recorded as "3" on Form 7A, a rating of "3" on Form 7 was recorded as "5" on Form 7A, and a rating of "4" on Form 7 was recorded as "7" on Form 7A. Intermediate ratings of "2", "4", and "6" on Form 7A were used to describe more fully the resources in the schools. The intermediate ratings were used extensively where two or more ratings on Form 7 were combined into a composite rating on Form 7A.

The tables on the pages that follow immediately show that the resource ratings were grouped into four adequacy categories. Where a resource was rated as "1", "2", or "3" on Form 7A, the resource was described as "inadequate". A rating of "4" was described as "somewhat inadequate", and a rating of "5" was described as "somewhat adequate". The "very adequate" term was reserved for resources assigned ratings of "6" or "7".

Operational aggregates compared to adequacy of facilities. The availability, arrangement, and adequacy of classrooms, shops, and laboratories assigned to or used by teachers of vocational agriculture formed groupings for making comparisons with operational aggregates. These data are summarized in Tables VI-15 and VI-16.

The hypotheses tested with the data summarized in Table VI-15 were to the effect that operational aggregates were independent of the adequacy of (1) classrooms, (2) shops, and (3) laboratories.[15] It may be observed that only in the case of classrooms was the hypothesis rejected.

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[14] A copy of Form 7A is included in Appendix A of this report.

[15] The data are based on ratings of the general suitability of the classroom, shop, or laboratory for vocational agriculture, in which the size, condition, and location of the room were considered.

TABLE VI-15

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO ANALYZE RELATIONSHIP BETWEEN ADEQUACY OF FACILITIES FOR VOCATIONAL AGRICULTURE AND MEAN OPERATIONAL AGGREGATES, WHEN SCHOOLS ARE GROUPED ACCORDING TO EXTENT OF ADEQUACY

Type of facility	Adequacy of Facilities: Inadequate N	Inadequate Means	Somewhat inadequate N	Somewhat inadequate Means	Somewhat adequate N	Somewhat adequate Means	Very adequate N	Very adequate Means	P
Classroom	4	577.25	10	865.10	14	883.64	13	1032.23	.01
Shop	21	845.24	7	809.71	6	1063.00	7	993.43	NS
Laboratory	34	884.71	2	811.00	4	1074.25	1	751.00	NS

The rejection of this hypothesis at the 1 per cent level indicates a significant relationship did exist. The size of the means ranged from a low of 577.25 for programs operated in schools with inadequate classrooms provided to a high mean of 1032.23 for the very-adequate classroom group. It should be noted by observing the distributions of the number of programs in each of the adequacy groups that 21 or 51 per cent of the shops, and that 34 or 82 per cent of the laboratories were appraised as being inadequate.

Data pertaining to classroom and shop arrangements for agriculture programs are summarized in Table VI-16. A hypothesis to the effect that operational aggregates for programs of vocational agriculture were independent of whether the classroom was used only for agriculture or for agriculture plus other subjects was found to be tenable, as is shown in Part A of Table VI-16. Therefore, it could be defended that either arrangement made little difference in program operations based on the operational aggregate measure. When the two null hypotheses tested with the data summarized in Part B of Table VI-16 were tested to the effect that operational aggregates were independent of (1) whether shops were not available, shops were used exclusively for agriculture, or shops were used jointly with industrial arts, and (2) whether shops were or were not available, the hypotheses were both rejected at the 5

TABLE VI-16

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE THE RELATIONSHIP BETWEEN CLASSROOM OR SHOP ARRANGEMENT FOR VOCATIONAL AGRICULTURE AND MEAN OPERATIONAL AGGREGATES

PART A

Item	Room Assignment Possibilities: Used for agriculture classes only N	Mean	Used for agriculture and other subjects N	Mean	P
Classroom arrangement	23	918.35	18	868.22	NS

PART B

Item	Shop Arrangement Possibilities: No shop available N	Mean	Used for agriculture classes only N	Mean	Agriculture and industrial arts shop combined N	Mean	P
Shop arrangement	9	742.11	17	928.35	15	952.60	.05

	No shop available N	Mean	Shop available N	Mean	
Shop arrangement	9	742.11	32	939.72	.05

per cent level of significance. The results of these tests present evidence to support the contention that availability of shops is significantly related to operational aggregates for programs of vocational agriculture. It would appear that the major factor was availability and not the nature of arrangement for use.

Operational aggregates compared to adequacy of equipment. The data summarized in Table VI-17 compares operational aggregates with adequacy of classroom, shop, and laboratory equipment. The three separate null hypotheses tested to the effect that operational aggregates for programs of vocational agriculture were not dependent on the adequacy of (1) classroom equipment, (2) shop equipment, and (3) laboratory equipment were all rejected at the 1 per cent, or greater, level of significance. These tests disclose evidence that supports the position that equipment has a bearing on program operations in vocational agriculture.

Observation of the data reported in Table VI-17 reveals that higher means are associated with the more adequate resources. The pattern shows that as the equipment, whether classroom, shop, or laboratory, are appraised as being more adequate, so do the means of the distributions determined from operational aggregates increase in size. In that, relatively speaking, higher operational aggregates are associated with higher operating programs, these findings help build a case for providing teaching equipment that is adequate for the task.

Operational aggregates compared to adequacy of teaching materials. The teachers who work from teaching outlines and have available adequate libraries of relevant books, bulletins, and periodicals plus adequate and relevant audio-visual aids such as models, charts, films, and filmstrips should have the operational advantage, other things being equal, over the teachers not having these materials adequately provided. To determine if teaching outlines, reference materials, and audio-visual aids were related to operational aggregates for programs of vocational agriculture, six different null hypotheses were tested with the data summarized.

It may be noted that five of the six null hypotheses tested to the effect that operational aggregates were independent of adequacy groupings based on (1) teaching outlines, (2) general reference materials, (3) technical reference materials, (4) management materials, (5) mechanical reference materials, and (6) audio-visual aids were rejected at the 5 per cent, or higher, level of significance. Only in the case of mechanical reference materials was the hypothesis found to be tenable.

TABLE VI-17

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN ADEQUACY OF EQUIPMENT FOR VOCATIONAL AGRICULTURE AND MEAN OPERATIONAL AGGREGATES, WHEN SCHOOLS ARE GROUPED ACCORDING TO EXTENT OF ADEQUACY

Type of equipment	Adequacy of Equipment								P
	Inadequate		Somewhat inadequate		Somewhat adequate		Very adequate		
	N	Means	N	Means	N	Means	N	Means	
Classroom	9	711.44	8	829.38	17	984.88	7	995.57	.01
Shop	15	726.93	13	971.31	8	1002.38	5	1040.00	.001
Laboratory	15	758.46	9	899.44	11	953.45	6	1131.67	.01

The pattern evident when the means of the operational aggregates for the various distributions are studied reveals a fairly consistent relationship with the higher operational aggregate means being associated with the higher adequacy groups. Here again the evidence clearly links the nature of operational effort to the resource variables studied. It may be observed in Table VI-18 that in only one instance was the mean of the operational aggregate over 800 for the inadequate group and in only one instance was the mean of the operational aggregates under 1000 for the very-adequate group. These findings disclose evidence that teaching materials tended to be very adequate where schools were operating programs at higher levels based on the operational aggregate measure.

Operational aggregates compared to auxiliary service resources. The extent to which auxiliary services, such as counseling, testing, and transportation for students and for teachers, were provided and were adequate for the needs of programs of vocational agriculture, was appraised. These data were used to establish adequacy groups for the purpose of testing the relationship between operational aggregate distributions and extent of adequacy of auxiliary service resources.

TABLE VI-18

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN ADEQUACY OF TEACHING MATERIALS FOR VOCATIONAL AGRICULTURE AND MEAN OPERATIONAL AGGREGATES, WHEN SCHOOLS ARE GROUPED ACCORDING TO EXTENT OF ADEQUACY

Types of teaching materials	Adequacy of Teaching Materials: Inadequate N	Inadequate Means	Somewhat inadequate N	Somewhat inadequate Means	Somewhat adequate N	Somewhat adequate Means	Very adequate N	Very adequate Means	P
Teaching outlines	5	673.40	10	815.70	21	948.19	5	1062.80	.01
General reference materials	5	748.00	17	809.12	14	974.43	5	1122.60	.01
Technical reference materials	4	789.25	12	764.42	20	994.35	5	1106.60	.01
Management reference materials	2	724.50	10	770.10	23	916.65	6	1086.17	.05
Mechanical reference materials	8	822.00	9	791.22	16	934.81	8	1012.00	NS
Audio-visual aids	4	772.25	13	775.77	16	997.25	8	952.40	.05

The data are summarized in Table VI-19, showing the frequency distributions and the mean of the operational aggregates for each distribution in the 41 school sample.

Of the three null hypotheses tested to the effect that operational aggregates were independent of the extent of adequacy of (1) guidance services,[16] (2) student transportation, and (3) teacher travel, the hypothesis relating to guidance services was rejected at the 5 per

[16] Separate ratings for adequacy of counseling services and testing programs were combined to obtain an overall rating for adequacy of guidance services.

TABLE VI-19

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN ADEQUACY OF AUXILIARY SERVICE RESOURCES FOR VOCATIONAL AGRICULTURE AND MEAN OPERATIONAL AGGREGATES, WHEN SCHOOLS ARE GROUPED ACCORDING TO EXTENT OF ADEQUACY

Type of special resources	Adequacy of Special Resources								P
	Inadequate		Somewhat inadequate		Somewhat adequate		Very adequate		
	N	Means	N	Means	N	Means	N	Means	
Guidance services	24	819.88	6	890.67	8	1092.00	3	997.67	.05
Student transportation	21	859.05	0	—	11	915.64	9	959.78	NS
Teacher travel	4	989.00	0	—	18	831.39	19	938.37	NS

cent level of significance. The student-transportation and teacher-travel null hypotheses were found to be tenable. Thus, there was statistical evidence to support the position that the adequacy of guidance services in the sample schools was related to program operations in agriculture based on the operational aggregate measure. However, it could be defended that student or teacher transportation provisions were not variables that showed a significant relation to program operations in vocational agriculture.[17]

[17] It should be noted that provision for student transportation was rated "inadequate" in instances where school officials did not furnish transportation for field trips. Many teachers, however, were conducting field trips, using privately-owned automobiles, operated by members of high school classes, for transportation. Thus, the issue was not whether or not field trips were used in instruction, but, rather, whether the student transportation was financed with public school funds.

As for teacher-transportation, it was mandatory for schools to provide a budget of not less than $420.00 per annum for mileage for vocational agriculture teachers. The majority of teachers, according to the data in Table VI-19, considered their budgetary allowances to be "adequate" or "very adequate".

Operational aggregates compared to special school-community program resources. Considerable emphasis in the program recommendations outlined in state plans for vocational agriculture is given to the need for supervised farming activities for student organizations as an integral part of the program and for capitalizing on community talent to enrich the programs. A number of special school-community program resources were identified and appraised in the 41 communities where the agriculture programs were studied. These data, as summarized in Table VI-20, served to form groupings based on extent of use into which the 41 schools were distributed.[18] Using the operational aggregate for each school as a measure, five null hypotheses to the effect that operational aggregates for programs of vocational agriculture were independent of extent of use of (1) privately-owned farms, (2) school plots or farms, (3) community talent, (4) Future Farmers of America, and (5) 4-H Clubs, were tested.

It may be observed in the probability column (P) of Table VI-20 that four of the null hypotheses tested were rejected at the 5 per cent, or greater, level of significance, and the fifth was not rejected. The extent to which supervised project work, whether on privately-owned farms or school-owned plots or farms, was utilized in agriculture programs, was found to be highly related to operational aggregates for these programs. A similar pattern prevailed for the extent community talent was utilized in program operations. Of the two youth organizations studied, the extent to which the Future Farmers of America, an organization of vocational agriculture students, was used as a part of program operations was highly related to the operational aggregates. No evidence was disclosed to indicate that the extent of usage of the 4-H Club youth organization, a non-school organization in which many vocational agriculture teachers were participating as local leaders, was related to program operations.

Relationship of Operational Aggregates to Human Resources

The resource most often assigned the highest priority in education is the teacher. Although presumed to occupy a paramount position in the educational matrix, the task of scientifically establishing evidence to support the premise is complicated and hazardous. The human personality as a resource consists of many perplexing variables such as abilities, attitudes, imaginations, values, motivations, biases, and energies which are difficult to identify, quantify, and control. Thus, the illusiveness of these variables

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[18] The ratings from Form 7A were combined as follows to form the groupings: Ratings of "1", "2", or "3" - used little; a rating of "4" - used moderately; a rating of "5" - used considerably; ratings of "6" or "7" - used extensively.

TABLE VI-20

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN USAGE OF SPECIAL SCHOOL-COMMUNITY PROGRAM RESOURCES FOR VOCATIONAL AGRICULTURE AND MEAN OPERATIONAL AGGREGATES, WHEN SCHOOLS ARE GROUPED ACCORDING TO EXTENT OF USAGE

Types of resources or organizations	Usage of Resources or Organizations: Used little N	Means	Used moderately N	Means	Used considerably N	Means	Used extensively N	Means	P
Use of privately-owned farms	10	764.30	12	809.75	13	999.62	6	1065.83	.01
Use of school plots or farms	28	839.29	6	957.17	4	1161.50	3	953.67	.05
Use of community talent and agencies	12	745.92	18	868.17	7	1103.03	4	1112.75	.001
Use of Future Farmers of America	5	672.40	7	934.57	17	859.94	12	1018.92	.05
Use of 4-H Clubs	16	870.50	9	874.11	14	926.14	2	994.50	NS

may serve to shroud the actual potency of certain more easily identified and quantified human resource variables. Although major attention was accorded material resources in the study, it was reasoned that certain readily available human resource variables should be investigated to complete more adequately the resource dimension. Fully recognizing the limitations imposed on the data, the investigators obtained qualification data, opinion data, and job description data for the vocational agriculture teachers in the 41 school sample. These data were used to form groupings for the purpose of testing the relationship of operational aggregates to the selected human resource variables.[19]

[19] The findings in this sub-section were based on data supplied by teachers on Form 3, Vocational Agriculture Teacher Self Analysis Inventory,, a copy of which form is included in Appendix A.

Operation aggregates compared to teacher qualifications. Based on the type of degree, nature of course work in advanced college training, teaching experience in total years and years in present position, and years of experience in other fields of agriculture and in other fields generally, groupings were developed. Based on the selected qualification variable groups and the corresponding distribution, null hypotheses to the effect that operational aggregates were independent of the qualification variable being studied were tested. The applicable data and test results are summarized in Tables VI-21 through VI-24.

It may be noted in Table VI-21 that the degree status of teachers showed no significant difference in the statistical test with the hypothesis tested being tenable at the 5 per cent level of significance. It could be defended within the level of sophistication of these data that variations among teachers based simply on degree status did not appear to have any significant relation to program operations in agriculture based on the operational aggregate measure.

TABLE VI-21

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN EDUCATION OF TEACHERS OF VOCATIONAL AGRICULTURE AND OPERATIONAL AGGREGATES, WHEN SCHOOLS ARE GROUPED ACCORDING TO LEVEL OF EDUCATION ATTAINED

	Level of Education								
	B.S. Degree only		B.S. Degree plus additional courses		M.S. Degree only		M.S. Degree plus additional courses		
Item	N	Means	N	Means	N	Means	N	Means	P
Educational level of teacher	2	624.50	29	924.62	5	900.60	4	855.75	NS

In that one teacher did not elect to complete and return his inventory, the report is based on the returns of 40 vocational agriculture teachers.

TABLE VI - 22

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN WHETHER VOCATIONAL TEACHERS HAVE PURSUED GRADUATE COURSES IN SELECTED AREAS AND MEAN OPERATIONAL AGGREGATES, WHEN SCHOOLS ARE GROUPED ACCORDING TO ADVANCED EDUCATION OF TEACHERS

Areas	Had Graduate Work in Selected Areas: Yes N	Yes Means	No N	No Means	P
Technical Areas					
Agricultural science	28	909.79	12	876.25	NS
Agricultural engineering	15	899.33	25	899.96	NS
Rural sociology	1	831.00	39	897.98	NS
Agricultural economics	14	853.71	26	924.50	NS
Advanced science	2	800.00	38	904.97	NS
One or more technical areas	33	916.70	7	819.71	NS
Professional Areas					
Agricultural education	31	922.87	9	820.00	NS
Foundations of education	19	957.21	21	847.71	NS
Educational guidance	10	948.60	30	883.43	NS
Educational administration	12	976.25	28	866.93	NS
One or more professional areas	33	934.58	7	735.48	.05

Data reported in Table VI-22 simply show, on the basis of two groups determined by "yes" or "no" answers to a question concerning having advanced training in five technical areas and four professional areas, that differences were not found to be significant in the nine null hypotheses tested.

Two additional null hypotheses, one to the effect that the operational aggregates for the five technical subject areas combined were independent of having or not having one or more of these courses and a similar one for the professional areas, were tested. The results of these two tests showed the null hypothesis for the technical area was not rejected, and the one for the professional area was rejected at the 5 per cent level of significance. Based on this statistical evidence, it could be defended that advanced training in one or more of the five technical areas did not appear to be significantly related to the operational aggregates, while advanced training in one or more of the four professional areas did show a significant relationship to the operational aggregates for programs of vocational agriculture. Observation of the data, however, indicates that the means of the operational aggregates in both instances were high for the "yes" groups.

Whether years of teaching experience overall or in the present system were considered, the pattern did not reveal any significant relationship to operational aggregates. It is shown in Table VI-23 that the two null hypotheses tested with these data were found tenable. Thus, it would be defended on the basis of teaching experience <u>per se</u> that evidence was not disclosed which tended to support years of teaching experience as being a factor which caused major differences in operational aggregates for agriculture programs.

TABLE VI-23

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN TEACHING EXPERIENCE OF TEACHERS OF VOCATIONAL AGRICULTURE AND MEAN OPERATIONAL AGGREGATES, WHEN SCHOOLS ARE GROUPED ACCORDING TO EXPERIENCE OF TEACHERS

Experience	Years of Teaching Experience						
	1 - 5 Years		6 - 10 Years		11 or more Years		
	N	Means	N	Means	N	Means	P
Total years of teaching experience	8	954.13	15	825.20	17	939.88	NS
Number of years in present position	20	922.25	9	825.11	11	919.82	NS

Table VI-24 summarizes data used to test the relationship of work experience other than high school teaching to operational aggregates. The hypotheses tested with these data also were found to be tenable. Thus, the tests made with these data presented no statistical evidence that either years of work experience in agriculture or in some other field were factors significantly related to operational aggregates for programs of vocational agriculture.

The data as identified, grouped and then tested to check whether such things as type of degree, nature of advanced college training, years of teaching experience, and years of work experience other than teaching, did not produce evidence to indicate a high relationship between operational aggregates and these human resource factors. Of the 16 hypotheses tested with the data summarized in Tables VI-21 through VI-24, only in the case of the null hypothesis tested to the effect that operational aggregates were independent of teachers grouped according to those having or not having one or more professional course in advanced college training was there a significant difference causing rejection of the hypothesis at the 5 per cent level of significance.[20]

Operational aggregates compared to teachers' opinion estimates of training and experience adequacies. To check whether there was evsdence that a relationship existed between the way agriculture teachers rated their competence and operational aggregates for the agriculture programs, teachers responded to a self-rating scale. These data and the results of statistical tests are reported in Tables VI-25 and VI-26.

Five technical areas including agricultural science, agricultural engineering, rural sociology, agricultural economics, and advanced science were selected because background knowledge in these areas was assumed to be needed for agriculture teachers. Four professional areas including agricultural education, foundation of education, educational guidance, and educational administration were selected because background knowledge in these areas was assumed to be important for agriculture teachers. The teachers were asked to indicate the extent to which they believed their background of training and experience made them competent in each of the nine areas.

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[20] The teacher's salary was an exception to this generalization. Data reported in Table VI-8 show that both the contracted salaries and the differentials between actual contracted salaries and minimum salaries prescribed by law based on training and experience were related significantly to variation in operational aggregates. See supra, pp. 143-145.

TABLE VI-24

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN NON-TEACHING EXPERIENCE OF TEACHERS OF VOCATIONAL AGRICULTURE AND MEAN OPERATIONAL AGGREGATES, WHEN SCHOOLS ARE GROUPED ACCORDING TO EXPERIENCE OF TEACHERS

Type of experience	Years of Experience								
	0 Years		1 - 2 Years		3 - 5 Years		5 or more Years		
	N	Means	N	Means	N	Means	N	Means	P
Total experience other than teaching	8	947.25	12	914.50	12	883.42	8	854.50	NS
Years experience in agricultural fields only	22	879.32	7	1031.86	4	827.50	7	873.00	NS

Table VI-25 summarizes the data for nine separate null hypotheses tested to the effect that operational aggregates for agriculture programs were independent of groupings based on teachers' opinions estimates of competency for each of the selected areas. It may be observed that the nine null hypotheses were found to be tenable. Consequently, it could be defended that teachers' ratings as grouped and tested disclosed no statistical evidence suggesting that differences in operational aggregates were significantly related to differences in self-competency judgments made by the teachers in the sample.

Table VI-26 was developed by establishing groupings based on combined adequacy scale values[21] for the five technical areas and for the four professional areas. It may be noted that the two null hypotheses tested to the effect that operational aggregates were independent of the combined adequacy score groups for (1) the technical areas and (2) the professional areas were found to be tenable.

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[21] The value "1" was given to "very inadequate" and the value "5" given to "very adequate" with values of "2", "3", and "4" given to the "in-between" items on the scale. Thus, the maximum total for the five technical areas was 25, and the maximum total for the four professional areas was 20.

TABLE VI - 25

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN OPINION ESTIMATES OF VOCATIONAL AGRICULTURE TEACHERS AS TO COMPETENCY IN SELECTED AREAS, BASED ON TRAINING AND EXPERIENCE, AND MEAN OPERATIONAL AGGREGATES, WHEN SCHOOLS ARE GROUPED ACCORDING TO OPINION ESTIMATES

Areas	Degrees of Adequacy: Inadequate N	Inadequate Means	Adequate N	Adequate Means	Very Adequate N	Very Adequate Means	P
Technical Areas							
Agricultural science	2	1141.50	23	874.61	15	906.00	NS
Agricultural engineering	15	840.80	15	864.00	10	1041.70	NS
Rural sociology	19	879.53	12	900.00	9	942.00	NS
Agricultural economics	5	900.60	19	875.84	16	927.81	NS
Advanced science	0	869.75	14	941.50	5	901.90	NS
Professional Areas							
Agricultural education	3	1053.33	19	834.58	18	942.88	NS
Foundation of education	9	794.89	14	888.57	16	955.06	NS
Educational guidance	20	891.90	13	892.46	6	940.83	NS
Educational administration	20	874.95	12	925.75	7	950.86	NS

TABLE VI-26

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE THE RELATIONSHIP BETWEEN COMBINED ADEQUACY SCORES BASED ON OPINION ESTIMATES OF VOCATIONAL AGRICULTURE TEACHERS AS TO PROFICIENCY IN TECHNICAL OR PROFESSIONAL AREAS AND MEAN OPERATIONAL AGGREGATES

PART A

Item	Adequacy Scores: 12 or under N	Mean	13-15 N	Mean	16-17 N	Mean	18 or over N	Mean	P
Combined adequacy scores in five technical areas	12	924.41	11	786.27	9	952.22	8	959.63	NS

PART B

Item	Adequacy Scores: 10 or under N	Mean	11-12 N	Mean	13-14 N	Mean	15 or over N	Mean	P
Combined adequacy scores in four professional areas	16	829.56	10	921.40	8	961.63	6	968.17	NS

These tests, therefore, disclosed no evidence which suggests anything different than was true for the data as it was used in Table VI-25.

Operational aggregates compared to job description of teachers. Information on subject and activity assignments, number of periods taught, average pupil contacts per day, and average teacher-pupil ratios were used to identify the job description of teachers. On the basis of the differences for each of these specific items, groups were established into which teachers in the sample were distributed. The operational aggregates for the program involving each teacher were used as the scores to compare the relationship of school operations to job description variables. These data are summarized in Table VI-27.

The five null hypotheses tested with the data found in Table VI-27 were to the effect that operational aggregates for agriculture programs were not dependent on the variations in teachers' job descriptions based on (1) teaching assignment by grades and subject areas, (2) periods taught per day, (3) total pupil contacts of teacher, (4) average size of teacher-pupil class ratio, and (5) number of special activity assignments. The five hypotheses were found to be tenable. It could be surmised that these data, as used to test the relationship between operational aggregates and teachers' job descriptions, would not warrant defending a particular job pattern based on one or the other variables used for grouping the five different job items. Neither, of course, do these findings deny the possibility that, under different test situations using different measures and groupings, a significant relationship between program operations and the nature of the job description could be found. It was stated in the first section of this chapter that the operational aggregate was a relative measure determined with a major purpose of discriminating among school programs. Although high operational aggregates for programs suggest that these programs are better than those with correspondingly lower operational aggregates, the desirable standards to indicate such things as inadequacy, adequacy, or excellence were not determined. With this limitation imposed on the data, what generalizations are made must be prefixed with "better than or more adequately than" as contrasted with such generalizations as "an excellent program or a poor program."

VI. THE COMBINATION OF VARIABLES FOR MULTIPLE REGRESSION

Thus far, Chapter VI has presented the results of a series of tests of significance designed to ascertain which of a number of selected variables were or were not related significantly to variations in operational aggregates. For this series of tests, the single classification analysis of variance was used.

TABLE VI - 27

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN JOB DESCRIPTION OF VOCATIONAL AGRICULTURE TEACHERS AND MEAN OPERATIONAL AGGREGATES

Item	N	Means	N	Means	N	Means	P
	Period Groupings						
	4 Period		5 Period		6 Period		
Number of assigned periods per day	14	898.50	16	901.67	10	898.30	NS
	Pupil Contact Groupings						
	40-80 pupils		81-120 pupils		121 or more pupils		
Total number of pupil contacts	13	851.15	15	940.40	12	901.50	NS
	Class Size Groupings						
	Less than 16 pupils		16-20 pupils		21 or more pupils		
Average number of pupils per period	20	904.35	12	904.67	8	880.75	NS
	Special Activity Groupings						
	1 - 2 activities		3 - 4 activities		5 or more activities		
Number of special assignments	12	887.17	20	894.20	8	932.38	NS
	Assignment Groupings						
	Agriculture Grades 9-12		Agriculture Grades 7-12		Agriculture plus other subjects		
Teaching assignment	6	970.67	5	949.60	29	876.45	NS

Following the identification of variables, which, taken individually, were found to be related significantly to variations in operational aggregates, additional research designs were formulated to identify a combination of variables which, taken collectively, accounted for a maximum proportion of variance in the operational aggregates. Here, correlation and multiple regression statistical methods were used.

The correlation and multiple regression analyses were based on the data from one dependent variable, the operational aggregate, and nineteen independent variables. These independent variables included the material resource items for which hypotheses were rejected at the 5 per cent level of significance or greater, together with three selected variables for which additional tests were desired. The variables included:[23]

Facilities

1. Classroom facilities
2. Shop facilities

Teaching Materials

3. General reference materials
4. Technical reference materials
5. Management reference materials
6. Mechanical reference materials
7. Teaching outlines
8. Audio-visual aids

Equipment

9. Classroom equipment
10. Shop equipment
11. Laboratory equipment

Auxiliary Service Resources

12. Guidance services

Special Service Resources

13. Use of community talent and agencies
14. Use of privately-owned farms
15. Use of school plots or farms
16. Use of Future Farmers of America organization

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[23] The number preceding each variable is designated the variable number, and is used in this section to identify the variable.

Other Variables

17. Assessed valuation per enrolled pupil
18. Salary in excess of state minimums
19. Size of school

Correlations Between Dependent and Independent Variables

As the initial step in the multiple regression sequence, the dependent variable was correlated with each of the independent variables. For the first sixteen items, listed above, the ratings assigned on Form 7A[24] were used as the values for the independent variables. For the last three items, the actual figures -- either the assessed valuation per enrolled pupil measured in dollars per pupil, the salary in excess of state minimums measured in dollars, or the number of students enrolled in the high school -- were used. Table VI-28 shows the product moment correlation coefficient for each variable, ranked in order of magnitude of the coefficients.

The data in Table VI-28 show that correlation coefficients ranged from .139 for size of school (Variable No. 19) to .630 for use of community talent and agencies (Variable No. 13). With few exceptions, the correlation coefficients were highest for variables pertaining to adequacy of facilities, equipment, and teaching materials.

Intercorrelations Between Independent Variables

Preparatory to beginning the multiple regression computations, intercorrelations between the nineteen independent variables were determined. These intercorrelation coefficients are shown in Table VI-29. Except where the independent variables are inter-related--for example, the coefficient between classroom facilities (Variable No. 1) and classroom equipment (Variable No. 9) is .71, and the coefficient between general reference material (Variable No. 3) and technical reference materials (Variable No. 4) is .81 -- the coefficients, generally, are not high. A special notation may be made of the coefficient between assessed valuation (Variable No. 17) and the other eighteen variables, and between size of school (Variable No. 19) and the other variables. Although the size of the school did not correlate highly with the dependent variable, the data in Table VI-29 show that there was a consistent positive relationship between size and the first sixteen independent variables. On the other hand, there was a rather consistent negative relationship between assessed valuation per enrolled pupil and the above variables.

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[24] See infra, pp. A - 34 ff.

TABLE VI-28

PRODUCT MOMENT CORRELATION COEFFICIENTS BETWEEN OPERATIONAL AGGREGATES AND NINETEEN CLASSIFICATION VARIABLES

Rank	Variable No.		r	Table	P
1	13	Usage of community talent and agencies	.630	VI-20	.001
2	11	Adequacy laboratory equipment	.620	VI-17	.01
3	1	Adequacy of classroom facilities	.601	VI-15	.01
4	10	Adequacy of shop equipment	.586	VI-17	.001
5	9	Adequacy of classroom equipment	.549	VI-17	.01
6	3	Adequacy of general reference materials	.538	VI-18	.01
7	7	Adequacy of teaching outlines	.505	VI-18	.01
8	4	Adequacy of technical reference materials	.493	VI-18	.01
9	5	Adequacy of management reference materials	.485	VI-18	.05
10	16	Usage of Future Farmers of America organization	.450	VI-20	.05
11	2	Adequacy of shop facilities	.428	VI-15	NS
12	14	Usage of privately-owned farms	.416	VI-20	.01
13	18	Salary in excess of state minimum	.411	VI-8	.01
14	12	Adequacy of guidance services	.394	VI-19	.05
15	6	Adequacy of mechanical reference materials	.358	VI-18	NS
16	8	Adequacy of audio-visual aids	.347	VI-18	.05
17	15	Usage of school plots or farms	.334	VI-20	.05
18	17	Assessed valuation per enrolled pupil	.270	VI-7	.01
19	19	Size of school	.139	VI-4	NS

TABLE VI-29

INTERCORRELATIONS OF NINETEEN INDEPENDENT VARIABLES FOR VOCATIONAL AGRICULTURE

Variable No.	Variable Number																			Variable No.
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	
1		.58	.31	.21	.37	.23	.27	.28	.71	.55	.60	.19	.37	.21	.17	.34	.25	.43	.12	1
2			.23	.22	.38	.40	.26	.37	.53	.65	.26	.03	.22	.22	-.07	.20	-.03	.38	.11	2
3				.81	.78	.66	.50	.55	.38	.62	.63	.48	.65	.30	.41	.32	.17	.12	.21	3
4					.81	.59	.56	.46	.34	.50	.56	.37	.65	.32	.38	.27	.27	.09	.14	4
5						.74	.47	.51	.34	.65	.51	.49	.68	.39	.20	.35	.09	.04	.24	5
6							.37	.62	.24	.65	.41	.31	.61	.36	.22	.36	-.13	-.09	.14	6
7								.33	.16	.52	.61	.49	.57	.09	.32	.42	-.03	.10	.21	7
8									.32	.65	.48	.33	.56	.16	.32	.26	-.03	.18	.27	8
9										.55	.44	.18	.36	.20	.31	.30	.12	.43	.30	9
10											.59	.46	.60	.49	.29	.44	-.06	.31	.30	10
11												.41	.67	.44	.63	.44	.11	.23	.14	11
12													.58	.52	.29	.[illegible]	-.12	.14	.39	12
13														.57	.43	.57	.00	.15	.24	13
14															.38	.53	-.03	.04	.09	14
15																.57	-.10	.09	.31	15
16																	-.13	.16	.29	16
17																		.14	-.29	17
18																			.44	18
19																				19

The small schools, which, generally, had greater financial wealth to support education --- as measured by assessed valuation per enrolled pupil --- were not providing material resources consistent with ability to support educational programs.

An additional point pertaining to use of special service resources is worthy of mention. The data in Table VI-20 show that the extent to which teachers made use of special service resources --- Variables Nos. 13, 14, 15, and 16 --- were variables significantly related to variation in operational aggregates. These variables pertained not to what the schools were providing, as was true of Variables Nos. 1 through 12, but what the teachers were doing. Yet, the correlation coefficients between salary (Variable No. 18) and these four usage variables were only .15, .04, .09, and .16, respectively. This would tend to indicate that the extent to which teachers were utilizing these special service resources --- through their imagination, initiative, and resourcefulness --- was not reflected in the salaries paid to the teachers. Yet the data show that the usage of these special service resources is an essential ingredient in the socially adapted vocational agriculture program.[25]

The Analysis of Data by Multiple Regression .

Starting with the correlation data shown in Table VI-28, the Wherry-Doolittle technique was applied to identify one possible combination of variables which accounted for a relatively large proportion of the variance of the operational aggregates.[26] Variable No. 13, use of community talent and agencies, for which the correlation coefficient was .630, offered the most in the prediction of the dependent variable. This variable, therefore, was chosen for the initiation of the multiple regression process. Successively, variables were selected and added to the previously chosen predictors until the increase in R^2, the proportion of variance of the operational aggregates attributable to the predictors, became less than .01. A total of eight variables was identified, which, in combination, resulted in an R^2 value of .66685.

An F test was applied to test the significance of the increase in R^2 attributable to each variable added to the previously selected

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[25] For an elaboration of this point, see Section II of Chapter VIII. The derivation of a use score, based on three of the four variables, is described. The correlation coefficient between the use score and the operational aggregate is .63, between salary and the operational aggregate is .42, but between the use score and salary is only .13.

[26] W.H. Stead, C.L. Shartle, et.al., Occupational Counseling Techniques (New York: American Book Co., 1940), pp. 245-252.

variables.[27] By the addition of the second predictor, Variable No. 1, adequacy of classroom equipment, the value of R^2 was increased from .39656 to .55360. This increase was highly significant, with $P < .001$. The selection and addition of the other six variables, shown in Table VI-30, did not result in significant increases in R^2, even though, numerically, the value of R^2 was increased from .55360 to .66685 with the addition of the six predictors.[28]

TABLE VI-30

INCREASE IN PREDICTION OF EIGHT VARIABLES BASED ON WHERRY-DOOLITTLE APPROXIMATIONS

Variable No.	Variable	Cumulative R^2	d	P
13	Use of community talent and agencies	.39656	-	-
1	Classroom facilities	.55360	.15704	.001
18	Salary in excess of state minimums	.58424	.03064	NS
17	Assessed valuation	.61158	.02734	NS
7	Adequacy of teaching outlines	.63729	.02571	NS
9	Adequacy of classroom equipment	.65125	.01396	NS
19	Size of school	.66212	.02087	NS
16	Use of Future Farmers of America organization	.66685	.00473	NS

[27] J.P. Guilford, Fundamental Statistics in Psychology and Education (Third edition; New York: McGraw Hill Book Co., Inc., 1956), p. 400.

[28] When added separately to Variable No. 13, Variables Nos. 9 and 18 gave increases significant at the 1 per cent level, and Variables Nos. 2, 10, 11, and 17 gave increases significant at the 5 per cent level.

In summary, correlation and multiple regression techniques were applied to identify one possible combination of variables which accounted for a large proportion of the variance of the operational aggregates. For the nineteen variables selected for further statistical treatment, correlation coefficients with the dependent variable ranged from .139 to .630. The Wherry-Doolittle technique was used to determine a combination of predictors which accounted for a large porportion of the variance of the operational aggregates. The predictor pertaining to use of community talent and agencies was determined to be the best single predictor on the basis of correlation with the dependent variable. The addition of the predictor classroom facilities gave a highly significant increase in the proportion of variance accounted for by regression. The addition of successive variables did not yield significant increases in R^2, although a combination of eight predictors did account for 66.685 per cent of the variance of the operational aggregates.

SUMMARY OF CHAPTER VI

Chapter VI introduced the operational aggregate as a measure of quality of instruction for educational programs. This measure, a bidimensional measure, is, mathematically, the sum of products of purpose factors and operational factors. Inasmuch as the purpose factor is a quantitative indication of the relative importance of purposes, and the operational factor is a quantitative indication of operational effort and emphasis exerted to attain a purpose adjusted for purpse importance, the operational aggregate, thus, is made a variable which takes into account both what the school is doing and the relative importance of what the school is doing. Since the contemporary design for vocational education was introduced into both the purpose factor and the operational factor, the order of magnitude of operation aggregates was assumed to be a quantitative indication of the extent to which programs of vocational agriculture in the sample were manifesting the previously identified and quantified social, economic, and technical conditions and trends. The operational aggregates for the 41 school sample varied widely, and the distribution of measures approximated a normal distribution.

After the operational aggregate was defined and its derivation explained, the balance of the chapter was devoted to (1) ascertaining the degree of validity of the measure; (2) studying the relationship between selected school and community, material resources, and human resource independent variables and the measure; and (3) determining a combination of independent variables which, according to multiple regression, accounted for a major proportion of variance in the measure. The findings were as follows:

1. A comparison between the operational aggregate and classifications of the 41 departments of vocational agriculture indicated that the operational aggregate was not independent of four classification groups as determined independently by representatives of the State Board for Vocational Education. Although the two measures were not identical--either in intent or design--it was believed that there was a sufficiently large number of elements common to the two measures to verify the adequacy of the scoring procedure used in the study.

2. When the relationship between operational aggregates and selected school and community variables was studied, it was found that only the variables (1) financial ability to support education, (2) salary of teachers, and (3) the financial effort to support education, independent of wealth, were related significantly to variations in operational aggregates. No evidence was disclosed to indicate that such school and community variables as size of school, geographical location in state, or rural-urban characteristics of the population were related significantly to variations in the operational measure.

3. None of the school organization variables--membership in the North Central Association of Colleges and Secondary Schools, structure for supervision of vocational education, structure for specialized guidance personnel, or whether the school offers vocational agriculture only or both vocational agriculture and industrial education--was found to be related significantly to variation in operational aggregates.

4. Material resources were found to be related significantly to variations in operational aggregates for nine of twelve variables studied. The adequacy of classroom facilities; classroom shop, and laboratory equipment; and general, technical, and management reference materials, teaching outlines, and audio-visual aids was not determined to be independent of variation in operational aggregates. The adequacy of shop and laboratory facilities and mechanical reference materials was independent of variation in operational aggregates, although directional differences were quite similar to the nine variables for which differences were significant. There was a difference in operational aggregates when schools with no shop facilities were compared with schools having shop facilities, regardless of degree of adequacy. No evidence was disclosed to reveal that having a separate classroom for vocational agriculture only, or having separate shop facilities for agriculture resulted in a significant increment in quality of program.

5. The adequacy of counseling--testing programs was identified as a variable significantly related to variation in operational aggregates.

6. The initiative, imagination, and resourcefulness of teachers, as manifested in use being made of four special service resources to augment and extend the effectiveness of instruction, was ascertained to

be related significantly to variations in operational aggregates. These four items were use of privately-owned farms and school plots or farms for directed experience, use of community talent or agencies, and use of the Future Farmer of America organization. Variation in degree of use of 4-H Clubs to augment instructional programs was independent of variation in operational aggregates.

7. Except for salary, previously noted, not a single human resource variable was found to be related significantly to variations in operational aggregates. The degree held by the teacher, advanced training in nine selected professional and technical areas, experience in teaching and related agricultural work, tenure in present position, opinion estimate of competency in nine selected professional and technical areas, subject assignment, activity assignment, number of periods assigned to teaching per day, average number of pupil contacts per day, and average pupil-teacher ratio were independent of oprational aggregates. It may be noted, however, that scores for schools in which teachers had had advanced training in one or more professional areas were significantly higher than scores of schools where teachers had no professional graduate courses.

8. Nineteen variables were selected for further study by correlation and multiple regression techniques and it was found that correlation coefficients ranged from .139 to .660. The variable of use of community talent and agencies correlated highest with the dependent variable. The addition of adequacy of classroom facilities gave a significant increase in R^2. The addition of six other selected variables did not yield a significant increase in R^2 but a combination of eight variables accounted for 66.7 per cent of the variance operational aggregates.

9. In conclusion, the data show that wealth, especially the willingness to use wealth in support of educational programs, salary, material resources, and the initiative, imagination, and resourcefulness of teachers to make use of special service resources were the variables or group of variables related significantly to variations in the quality measure of school programs.

CHAPTER VII

EDUCATIONAL RESOURCES FOR VOCATIONAL AGRICULTURE AND THEIR RELATIONSHIP TO COMMUNITY AND SCHOOL VARIABLES

The means for expediting, facilitating, and implementing the teaching-learning activities in programs of vocational agriculture are dependent, in part, upon the availability and suitability of education resources. In the preceding chapter, it was reported that certain resources were related significantly to the level at which programs of vocational agriculture operated as determined by the operational aggregate means for these programs. Where major differences were reported between program operations and adequacy of resources, the greatest proportion of programs with the higher operational measures tended to be associated with schools that provided the adequate resources. Thus, it would be helpful in educational planning to ascertain whether there were community and school variables which evidenced a high relationship to differences in availability-suitability ratings of resources. In this chapter, attention is directed toward ascertaining the extent to which resources, as rated for the 41 schools in this sample, were dependent upon given community and school variables.[1]

Chapter VII describes the availability and suitability of resources as noted for vocational agriculture programs and reports the results of the statistical tests applied to detemine the relationship between ratings of resources and community-school variables.

I. THE APPRAISAL OF VOCATIONAL AGRICULTURE RESOURCES

The data reported in Table VII-1 show the ratings assigned to resources for 41 programs of vocational agriculture and the qualification characteristics of agriculture teachers. Members of the research staff appraised agriculture resources by completing the instrument, Appraisal of Resources: Vocational Agriculture (Form 7).[2] Material resources were rated on a four-point scale ranging between 1, indicating "very inadequate" or "used little," and 4, indicating either "very adequate"

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[1] The objective listed in Section III of Chapter I, treated in Chapter VII, is:

(10) To ascertain the relationship between human and material resources provided to operate programs of vocational agriculture and selected school and community variables.

[2] Infra, pp. A-27 ff.

TABLE VII-1

RESOURCES APPRAISED FOR VOCATIONAL AGRICULTURE PROGRAMS IN FORTY-ONE SCHOOLS, RELATIVE TO ADEQUACY (PART A) AND EXTENT OF USE (PART B), AND RELATIVE TO QUALIFICATION CHARACTERISTICS OF TEACHERS (PART C), SHOWING PER CENT IN EACH CATEGORY

Resource Items	Rating Categories: Adequacy Rating of Resources — Very inadequate (Per cent)	Somewhat inadequate (Per cent)	Somewhat adequate (Per cent)	Very adequate (Per cent)
PART "A"				
Facilities				
Classroom	10	24	34	32
Shop	51	17	15	17
Laboratory	83	5	10	2
Equipment				
Classroom	22	20	41	17
Shop	36	32	20	12
Laboratory	36	22	27	15
Teaching Materials				
General Reference	12	42	34	12
Technical Reference	10	29	49	12
Management Reference	5	24	56	15
Mechanical Reference	20	21	39	20
Teaching Outlines	12	24	52	12
Audio-visual Aids	10	31	39	20
Auxiliary Service				
Guidance Services	58	15	20	7
Teacher Travel	10	0	44	46
Student Transportation	51	0	27	22

TABLE VII-1 (Continued)

Resource Items	Rating Categories: Ratings of Extent of Usage — Used little (Per cent)	Used moderately (Per cent)	Used considerably (Per cent)	Used extensively (Per cent)
PART "B"				
Special Resources				
Community Personnel and Agencies	29	44	17	10
Privately Owned Farms	24	29	32	15
School Owned Farms or Plots	68	15	10	7
Future Farmers of America	12	17	42	29
4-H Club Activities	39	22	34	5

Education Items	Education-Experience Characteristics of Teachers: B.S. Degree only (Per cent)	B.S. Degree and course beyond (Per cent)	M.S. Degree only (Per cent)	M.S. Degree and course beyond (Per cent)
PART "C"				
Education				
Educational attainment of teachers	5	72	13	10

Experience Items	2 or fewer Years (Per cent)	3 - 5 Years (Per cent)	6 - 10 Years (Per cent)	11 or more Years (Per cent)
Experience				
Practical Experience in Agriculture	72	10	13	5
Total of All Teaching Experience	3	17	38	42
Tenure in Present Position	13	38	22	27

or "used extensively." Resources falling within the classification of facilities, equipment, teaching materials, and auxiliary services were rated for adequacy. Resources classified as special services were rated for extent of use. To arrive at school ratings for the general resource areas, the detailed ratings recorded on Form 7 were used as the basis for ascertaining the general ratings which were recorded on Form 7A.[3] Vocational agriculture teachers were requested to complete the instrument, Self-analysis Inventory: Vocational Agriculture Teacher (Form 3),[4] and education and experience characteristics of vocational agriculture teachers were obtained from the data reported on this form.

In Part A of Table VII-1, it may be observed that in the 41 schools studied, the classrooms were rated "adequate" in two thirds of these schools; conversely, two thirds of the agricultural shops were rated "inadequate", and seven eights of the laboratory facilities were rated "inadequate."

Pertaining to equipment, the data in Part A of Table VII-1 reveal that in 58.5 per cent of the schools, the classroom equipment was rated "inadequate," the shop equipment was rated "inadequate" in 68 per cent of the schools; and the laboratory equipment was found to be inadequate in 58.5 per cent of the schools.

A review of the data pertaining to availability-suitability ratings for technical, management, and mechanical assigned reference materials shows that these resources were judged to be "adequate" in a majority of schools. In the case of general reference materials, less than one half (54 per cent) of the schools received an "adequate" rating. The availability-suitability ratings accorded to teaching outlines and audio-visual aids indicate that slightly more than 60 per cent of the schools were judged "adequate" for these teaching aid resources.

Eighty per cent of the schools were making "adequate" financial provisions for teacher travel; however, only 50 per cent of these schools had made adequate financial provisions for student travel for field trips. Guidance Services, as an auxiliary service resource, were found to be "inadequate" for three fourths of the schools in the study.

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[3] Infra, pp. A-34 ff.

[4] Infra, pp. A-5 ff.

Part B of Table VII-1 pertains to the use made of special service resources in the vocational agriculture instructional program of the schools. Slightly less than one half of the teachers indicated that they were making considerable use of privately-owned farms--generally, the farms on which their students were residing--in carrying out programs of directed experience and experimentation. In more than one half of the schools, limited use was being made of privately-owned farms in programs of directed experience and experimentation. In addition to the use of privately-owned farms, thirteen of the 41 schools provided school plots or farm to supplement the directed experience and experimentation programs. Approximately one sixth of the schools in the study were found to be making considerable use of the school plot or farms to carry on directed experience programs, demonstrations, and experimentation, and to provide experience in developing managerial abilities. Only one fourth of the schools studied were enriching and extending the effectiveness of classroom instruction by using the readily available professional and lay talent and resources provided by other agricultural and related agencies in the community.

The extent to which school and non-school youth organizations were being utilized in attaining purposes of vocational agriculture also is shown in Part B of Table VII-1. All vocational agriculture teachers were advisors of local chapters of Future Farmers of America, an in-school national organization of students of vocational agriculture, and nearly 71 per cent of the teachers indicated that this organization, as a resource, was being used considerably to implement and reinforce the instructional program. Frequently, vocational agriculture teachers in Indiana serve as local 4-H club leaders, a non-school organization for youth which is a part of the county agricultural extension program. Of the 41 teachers queried, sixteen, or only 39 per cent, indicated that considerable or extensive use of this organization was being made to attain the purposes of vocational agriculture.

The data in Part C of Table VII-1 describes the education and experience characteristics of vocational agriculture teachers. Approximately three fourths of the teachers had not, as yet, obtained a master's degree. It was also found that approximately three fourths of the teachers had two or fewer years of practical work experience in agriculture. Of the teachers in the sample, only 20 per cent had fewer than five years of teaching experience, and 50 per cent of these teachers were employed in their present position for five or fewer years.

II. THE RELATIONSHIP BETWEEN RESOURCES AND COMMUNITY VARIABLES

The community variables selected for study included size of school, financial ability, geographic location, and rural-urban classification of the student body. Ratings were assigned to material resources present in the schools for vocational agriculture which included facilities, equipment, teaching materials, auxiliary services, and operational resources. Personnel data regarding human resources also were obtained. These data were collected to test whether particular community variables were significantly related to the availability-suitability rating assigned to material and human resources which were present in the schools.

Relationship Between Material Resources and Community Variables

Table VII-2, Parts A and B, contains the data used to test null hypotheses to the effect that ratings assigned to material resources were independent of the given community variables. The chi-square test of independency in contingency tables was the statistic used to test the null hypotheses. These hypotheses were found to be tenable at the 5 per cent level of significance.

The tenability of these hypotheses disclosed no evidence to suggest that the availability-suitability ratings assigned to material resources for programs of vocational agriculture in the schools studied were dependent upon size of school, financial ability, geographic location, and rural-urban classification of the student body.

Relationship Between Human Resources and Community Variables

In this part of the study, an effort was made to determine the relationship between teacher qualifications, as measured by type of college degree held, amount of practical work experience in agriculture, number of years spent in teaching, tenure in present teaching position, and the selected community variables. Null hypotheses were formulated to the effect that variations in teacher qualifications were independent of the specific community variables used in this study, as reported in Part C of Table VII-2. These hypotheses were found to be tenable at the accepted level of significance. Thus, no evidence was disclosed to suggest that size of school, financial ability, geographic location, or rural-urban classification of the student body were variables significantly related to education and experience characteristics of vocational agricultre teachers.

TABLE VII-2

RESULTS OF STATISTICAL TESTS OF THE RELATIONSHIP BETWEEN RATINGS AND CHARACTERISTICS OF RESOURCES OF FORTY-ONE VOCATIONAL AGRICULTURE PROGRAMS, AND FOUR COMMUNITY VARIABLES, SHOWING PER CENT OF RESOURCES RATED ADEQUATE (PART A) AND USED CONSIDERABLY (PART B), AND FOR GIVEN QUALIFICATIONS OF TEACHERS (PART C)

Resource Items	Community Variables*														
	School Size				Financial Ability			Geographic Location					Census Make-up		
	S	M	L		S	H		N	NC	SC	S		R	U	
	%	%	%	P**	%	%	P**	%	%	%	%	P**	%	%	P**
PART "A"															
Facilities															
Classroom	62	58	88	-	57	75	-	82	73	67	29	-	63	67	-
Shop	33	25	38	-	29	50	-	36	46	33	0	-	38	28	-
Laboratory	5	7	38	-	14	10	-	18	9	17	0	-	6	16	-
Equipment															
Classroom	48	56	88	-	48	70	-	64	73	58	29	-	38	72	-
Shop	33	17	50	-	29	35	-	18	36	33	43	-	19	40	-
Laboratory	48	25	50	-	38	45	-	27	36	50	57	-	44	40	-
Teaching Materials															
General Ref.	43	42	63	-	38	55	-	36	55	42	57	-	31	56	-
Technical Ref.	62	56	63	-	48	75	-	82	64	33	71	-	56	64	-
Management Ref.	67	75	75	-	67	75	-	73	91	50	71	-	75	72	-
Mechanical Ref.	62	56	50	-	48	65	-	73	64	42	57	-	56	60	-
Teaching Outlines	67	50	75	-	62	65	-	64	73	50	71	-	69	60	-
Audio-visual Aids	52	58	75	-	48	70	-	64	55	58	57	-	50	64	-
Auxiliary Service															
Guidance Services	24	17	50	-	24	30	-	27	18	33	29	-	13	36	-
Teacher Travel	95	91	63	-	94	80	-	91	91	83	100	-	94	92	-
Student Transp.	52	58	38	-	47	50	-	64	90	25	14	-	94	52	-

*Community Variables: (1) School Size -- S=Small, 100-150 pupils, grades 9-12; M=Medium, 300-450 pupils, grades 9-12; and L=Large, 600 or more pupils, grades 9-12. (2) Financial Ability -- L=Low, $7000.00-under, assessed valuation per pupil; and H=High, $7001.00-over, assessed valuation per pupil. (3) Geographic Location (in Indiana) -- N=North; NC=North Central; SC=South Central; and S=South. (4) Census Make-up -- R=Highly Rural student population; and U=Highly Urban student population.

TABLE VII-2 (Continued)

Resource Items	Community Variables*															
	School Size				Financial Ability			Geographic Location					Census Make-up			
	S	M	L		L	H		N	NC	SC	S		R	U		
	%	%	%	P	%	%	P	%	%	%	%	P	%	%	P	
PART "B"																
Special Resources																
Community Personnel and Agencies	19	25	50	-	19	35	-	18	27	33	29	-	19	32	-	
Privately Owned Farms	43	42	63	-	48	45	-	46	46	42	57	-	44	48	-	
School Owned Farms or Plots	14	8	38	-	14	20	-	9	9	25	29	-	13	20	-	
Future Farmers of America	67	67	88	-	71	70	-	82	45	75	86	-	81	64	-	
4-H Club Activities	43	50	13	-	38	40	-	46	36	33	43	-	38	40	-	
PART "C"																
Education of Teachers																
Masters or Beyond	25	17	38	-	25	25	-	30	18	17	29	-	19	25	-	
Experience of Teachers																
Non-teaching in Agriculture 3 or more years	30	25	25	-	25	30	-	30	36	17	29	-	31	24	-	
Teaching for 5 or more years	65	100	88	-	85	75	-	80	64	92	86	-	63	92	-	
Teaching Present Position, 5 or more years	30	67	75	-	55	45	-	40	55	58	33	-	21	61	-	

III. THE RELATIONSHIP BETWEEN RESOURCES AND SCHOOL ORGANIZATION VARIABLES

To determine whether such school organization variables as program structure, membership in North Central Association of Colleges and Secondary Schools, and structure for administration of vocational education had any bearing upon the availability-suitability ratings of resources, appropriate statistical tests were made. Tables VII-3 and VII-4 report the data pertinent to this section of the chapter.

Relationship Between Material Resources and School Organization Variables

The data used to test null hypotheses that ratings assigned material resources for vocational agriculture programs were independent of the given school organization variables are reported in Part A of Table VII-3. These hypotheses were found to be tenable at the 5 per cent level of significance when the chi-square statistical procedure was applied. Thus, there was no basis for concluding that North Central membership employment of a director of vocational education, and a school program structure that offers vocational agriculture only, as compared with a school offering both vocational agriculture and industrial education, were variables that could be identified as being related to availability-suitability ratings accorded to the vocational agriculture resources.

Relationship Between Human Resources and School Organization Variables

To test the relationship between human resources and given school organization variables, the chi-square test was applied to the data reported in Part B of Table VII-3. Here, the null hypotheses to the effect that the ratings of human resources described as teacher qualifications were independent of selected school organization variables, were tested and found to be tenable at the selected level of significance. It is, therefore, concluded that the data in this study did not reveal statistical evidence to suggest that North Central Association membership, administrative structure for vocational education, or school program structure which offers vocational agriculture only, as compared with schools offering both vocational agriculture and industrial education were highly related to variations found in teacher qualifications.

Table VII-4 reports the findings which pertain to the ratings assigned to testing and counseling services rendered to the vocational agriculture program and the availability of special guidance personnel in the school. The null hypothesis to the effect that ratings assigned to testing services were not dependent upon the availability of special guidance personnel was tested and was found to be tenable at the

TABLE VII-3

RESULTS OF STATISTICAL TESTS OF THE RELATIONSHIP BETWEEN RATINGS AND CHARACTERISTICS OF RESOURCES OF FORTY-ONE VOCATIONAL AGRICULTURE PROGRAMS AND THREE SCHOOL ORGANIZATION VARIABLES, SHOWING PER CENT OF RESOURCES RATED ADEQUATE (PART A), AND FOR GIVEN EDUCATION-EXPERIENCE CHARACTERISTICS OF TEACHERS (PART B)

Resource Items	School Organizatic Variables*								
	Program Structure			Vocational Direction			Members North Central		
	Ag. only	Ag. + Ind. Ed.		Yes	No		Yes	No	
	%	%	P**	%	%	P**	%	%	P**
PART "A"									
Facilities									
Classroom	60	32	-	67	63	-	67	45	-
Shop	30	68	-	17	36	-	24	40	-
Laboratory	10	13	-	7	12	-	19	5	-
Equipment									
Classroom	10	62	-	67	55	-	71	45	-
Shop	40	29	-	33	30	-	33	30	-
Laboratory	29	45	-	50	39	-	43	40	-
Teaching Materials									
General Ref.	50	45	-	50	45	-	43	50	-
Technical Ref.	50	65	-	33	64	-	57	65	-
Management Ref.	80	68	-	50	73	-	62	80	-
Mechanical Ref.	70	55	-	33	61	-	52	65	-
Teaching Outlines	70	61	-	50	58	-	57	60	-
Audio-visual Aids	50	61	-	50	58	-	57	60	-

TABLE VII-3 (Continued)

Resource Items	School Organization Variables*								
	Program Structure			Vocational Direction			Members North Central		
	Ag. only	Ag. + Ind. Ed.		Yes	No		Yes	No	
	%	%	P**	%	%	P**	%	%	P**
PART "B"									
Education of Teachers									
Masters or Beyond	11	26	-	33	17	-	30	15	-
Experience of Teachers									
Non-teaching in Ag., 3 or more years	22	29	-	33	26	-	25	30	-
Teaching for 5 or more years	78	81	-	100	74	-	90	70	-
Teaching in Present Position, 5 or more years	22	57	-	50	48	-	65	35	-

*School Organization Variables: (1) Program Structure -- Ag. only = Schools offering programs of vocational agriculture only; Ag. & I. Ed. = Schools offering programs of vocational agriculture and Industrial Education. (2) Vocational Director -- Yes = Schools where a vocational director is employed to administer vocational programs; No = Schools where no special vocational director is employed. (3) Members North Central -- Yes = Schools that are accredited by the North Central Association of Colleges and Secondary Schools; No = Schools which are not accredited.

**Probability

TABLE VII-4

RELATIONSHIP BETWEEN RATINGS ASSIGNED SELECTED GUIDANCE SERVICES AVAILABLE TO VOCATIONAL AGRICULTURE INSTRUCTORS AND THE NATURE OF THE GUIDANCE PERSONNEL STRUCTURE, SHOWING RESULTS OF TESTS OF SIGNIFICANCE

Guidance Services and Provisions for Guidance Personnel	N	Inadequate (Per cent)	Adequate (Per cent)	Results of chi-square tests
Testing Services				
None	15	60.0	40.0	
Part-time	20	45.0	55.0	
Full-time	5	20.0	80.0	NS
Counseling Services				
None	15	93.3	6.7	
Part-time	20	70.0	30.0	
Full-time	5	20.0	80.0	.01

accepted level of significance. It should be observed that the proportion of adequacy ratings which were assigned to the schools for testing services were quite similar between the schools which did not provide special guidance personnel and those that provided part--time guidance personnel. But, when full-time personnel was available, the proportion of adequacy ratings was impressive.

A second null hypothesis tested was to the effect that ratings assigned to counseling services were not dependent upon the availability of special guidance counselors. This hypothesis was rejected at the 1 per cent level of significance. The extent to which special guidance personnel were available, it may be observed, was proportional in a direct manner to the adequacy of the counseling services, as determined by the raters.

An implication that may be drawn from the data reported in Table VII -4 is that many schools carry on a considerable amount of testing, regardless of the provision for full-time guidance personnel. However, there is less likelihood that students of agriculture will obtain guidance services other than testing when no personnel are assigned to devote a significant amount of time to counseling activities.

IV. THE RELATIONSHIP BETWEEN ADMINISTRATOR BUDGET ADEQUACY RATINGS AND THE ASSIGNED RATINGS OF SELECTED RESOURCES

In Table VII-5, data are presented which compare school administrator judgment of whether budget provisions for selected vocational agriculture resources were adequate, to the adequacy ratings assigned to resources by the research staff. On a general information questionnaire[5] completed by the principals of the schools, information was secured indicating whether these administrators believed adequate provisions had been made in their school budgets to make available the needed teaching materials and aids, shop equipment, and student transportation for programs of vocational agriculture. These administrator judgments then were checked against the adequacy ratings assigned to resources by the research staff.

It may be observed from the data reported in Table VII-5 that the proportion of administrators who judged adequate financial provisions had been provided for resources was higher, in every instance, than the proportion of schools rated as having adequate general and technical reference materials and audio-visual aids. In only one instance was there evidence which would indicate extremely high agreement between administrator judgment of budget provisions

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[5] Form 2, see infra, pp. A-1 ff.

TABLE VII-5

RESULTS OF TESTS OF SIGNIFICANCE MADE OF COMPARISONS BETWEEN ADMINISTRATOR JUDGMENT CONCERNING ADEQUACY OF BUDGET PROVISIONS FOR FIVE SELECTED RESOURCES AND THE ADEQUACY RATINGS ACCORDED RESOURCES BY THE RESEARCH STAFF RATERS FOR VOCATIONAL AGRICULTURE PROGRAMS

PART A
COMPARISONS

SELECTED RESOURCES	Administrators judging provisions adequate		Administrators judging provisions inadequate		Per cent judging resource adequate	
	Rated as Adequate N.	Rated as Inadequate N.	Rated as Adequate N.	Rated as Inadequate N.	Admin. %	Raters %
General Reference	15	13	3	7	74	47
Technical Reference	19	9	4	6	74	61
Audio-visual Aids	18	10	4	6	74	58
Shop Equipment	11	8	2	16	51	35
Student Transportation	15	10	4	9	66	50

PART B
RESULTS OF STATISTICAL TESTS

Resource area	Pairs of observations	Pairs of disagreement	Distribution	Associated Probability	Log
General Reference	38	16	13-3	.022; P<.05	8.34242-10
Technical Reference	38	13	9-4	.266; P>.05	9.42488-10
Audio-visual Aids	38	14	10-4	.180; P>.05	9.25527-10
Shop Equipment	37	10	8-2	.110; P>.05	9.25527-10
Student Transportation	38	14	10-4	.180; P>.05	9.25527-10
Sum					45.31923-50

Chi-square = (2) (2.302585) (4.68077) = 21.556; P<.02

and ratings assigned to resources. In the instance where eighteen administrators indicated that budget provisions for shop equipment were inadequate, this resource was rated "inadequate" in sixteen of these eighteen schools.

To establish whether the differences noted between administrator judgment of budget adequacy for resources and ratings assigned resources were due to the difference of the two conditions for appraisal, the sign test was applied to test five null hypotheses to the effect that when differences occurred the median of the differences was zero. That is, there was equal likelihood that where administrators judged budgetary provisions for resources as being "adequate," the raters had assigned "inadequate" ratings to the resources, and where the administrators made judgments indicating "inadequacy" the raters assigned "adequate" ratings. Pertinent information, used in testing these hypotheses, and the results of the statistical tests are reported in Part B of Table VII-5.

Of the five null hypotheses tested in only one instance--that pertaining to general reference materials--was the difference of one frequency great enough to cause rejection of the null hypothesis at the 5 per cent level of significance. In testing the null hypotheses concerning technical library references, audio-visual aids, shop tools, and student transportation, no evidence was disclosed by application of the sign test technique to show that the observable differences in frequencies between administrator judgment and rater appraisal of adequacy and inadequacy exceeded the requirements needed for rejection of the hypotheses.

The consistency of the pattern in which the observable differences appeared, as evident from a study of the data presented in Table VII-5, suggested a need to evaluate the composite in addition to the independent cases discussed in the preceding paragraphs. To arrive at a single statistical comparison based on the cumulative effect of differences, the probabilities from the independent tests of significance were combined to test the null hypothesis that the differences occurred by chance. For this test, the common logarithm of each probability was determined and then transformed to a natural logarithm, as reported in Part B of Table VII-5. These data were used in calculating a composite chi-square value. For 10 degrees of freedom, the obtained chi-square value exceeded the value required for significance at the 2 per cent level. Thus, by combining probabilities of independent tests of significance, it may be concluded that the observed differences represent real differences that could have occurred by chance in fewer than two cases out of 100.[6]

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[6] S. Siegel, Nonparametric Statistics for the Behavioral Sciences (New York: McGraw-Hill Book Co., Inc., 1956) pp. 68-72.

SUMMARY OF CHAPTER VII

The educational resources that are available and suitable for instructional programs are considered the means provided to facilitate the teaching-learning processes. In Chapter VI, it was found that certain material resources were related significantly to the level at which programs of vocational agriculture operated as determined by the operational aggregate measure for these programs. Where major differences did exist in program operations and in availability-suitability ratings of resources, the greater proportion of programs with the higher operational aggregate tended to be associated with schools that provided the more adequate resources. This finding suggests the need for ascertaining whether there are community and school variables that statistical evidence identifies as being highly related to differences in availability-suitability rating of resources. This chapter describes the resources present for vocational agriculture in the 41 program study, and reports results of statistical tests applied to determine whether there was evidence to suggest that a significant relationship existed between a selected number of community and schools organization variables and ratings accorded resources for programs of vocational agriculture.

The criteria and procedures used as the basis of rating resources for programs of vocational agriculture disclose evidence which indicates wide variations in the availability-suitability for material resources, and in the use of special service resources. Specific findings are summarized as follows:

1. In two out of every three schools studied, the classroom and the classroom equipment were accorded ratings of adequate whereas, in only one of three schools were the shop and the shop equipment appraised as being adequate.

2. Although 41.5 per cent of the schools had available laboratory equipment rated adequate, special laboratory facilities were not available or rated inadequate in 88 per cent of the schools.

3. Library reference materials in the technical, management, and mechanical fields were appraised as being suitable and available in the quantity needed in three out of five schools, but the general reference materials were found to be available and suitable in only one half of the schools.

4. In three out of every five schools in the sample, teachers had adequate teaching outlines and audio-visual aids needed to help plan and facilitate the instructional program.

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7 E.F. Lindquist, Statistical Analysis in Educational Research,

5. Guidance services, as an auxiliary resource available and suitable for programs of vocational agriculture, were appraised as being inadequate in three out of each four schools; however, in school systems employing full-time specialists in guidance, the testing and counseling services provided for vocational agriculture were rated as adequate or above adequate in a high proportion of the schools.

6. Privately-owned farms to carry out programs of directed experience as agriculture experimentation were used considerably or extensively in one out of each two schools.

7. School farms or plots as a resource for farm practice for agricultural experimentation activities were found to be available and used in only one out of each six schools.

8. The professional and lay talent and resources of the community were found to be used considerably or extensively to enrich and extend classroom instruction by teachers of vocational agriculture in only one of every four schools studied.

9. The Future Farmer of America organization was found to be used considerably or extensively by teachers to implement and reinforce classroom instruction in 70 per cent of the schools, whereas the 4-H club program was used purposely by teachers to complement classroom instruction in only 39 per cent of the schools.

10. Qualification data of vocational agriculture teachers revealed that about one fourth of the teachers held a master's degree, had three or more years of previous practical experience in agriculture, and had five or fewer years of teaching experience, and that one in every two teachers had tenure of five or more years in the position in which they were currently employed.

Results of tests of significance applying to tests in relationship of availability-suitability ratings or resources for programs of vocational agriculture and community and school variables may be summarized as follows:

1. The study disclosed no statistical evidence to suggest that differences in ratings assigned material resources nor that differences in the qualifications of teachers were found to be highly associated with variables of size of schools, financial ability to support education, geographical location, or rural-urban classification of the student body.

2. Similarly, no statistical evidence was disclosed in this

(Boston: Houghton Mifflin Company, 1940), pp. 46-47.

study to suggest that differences in the material and human resources selected for study were found to be highly associated with differences in such school organization variables as program structure, affiliation with the North Central Association of Colleges and Secondary Schools, or administrative structure for vocational education.

When data were analyzed that compared administrator judgment concerning the adequacy of the budget for selected resources with suitability-availability ratings assign these resources for programs of vocational agriculture, the following points summarize the findings.

1. There was little evidence disclosed to the effect that administrative judgment concerning budget adequacy for resources would be an adequate guage or clue indicative of the availability and suitability of these resources as determined by the standards and procedures utilized by the ratings research staff to appraise the given resources.

2. A study of the data did disclose evidence that would serve as a basis for supporting the premise that if an administrator judgments indicated inadequate budget provisions were being made for shop equipment, there was a high likilihood that the availability-suitability ratings for shop equipment would be appraised inadequate by the research staff.

3. Where there were differences between the ratings of the research staff for adequacy of resources, and the judgment of the high school principals as to adequacy of budgetary provisions for these resources it was found that the administrators indicated a significantly higher proportion of adequate ratings than did the members of the research staff.

CHAPTER VIII

THE INTERRELATIONSHIP AMONG PURPOSES, OPERATIONS, AND RESOURCES OF PROGRAMS OF VOCATIONAL AGRICULTURE

Thus far, the analysis of programs of vocational agriculture has been directed toward a study of the relative importance of the purposes of the program; the operational effort and emphasis being put forth to attain each purpose; the operational aggregate, a score which links operational effort and emphasis to purposes; and the resources provided to operate programs of vocational agriculture. The present chapter examines the interrelationship among purposes, operational effort and emphasis, and resources provided to operate the program.[1]

I. THE DESCRIPTION OF SCORES USED IN THE ANALYSIS

The four scores used in the analysis of interrelationship are shown in Table VIII-1. The scores include the operational aggregate, a school purpose acceptance score derived for each school, a score descriptive of the material resources provided by the school, and a score describing the extent of use of special service resources in the school.

1. Operational aggregate (Column A). The operational aggregate was the measure of operational emphasis and effort, qualified according to the relative importance of the purpose, as presented in Chapter VI.[2]

The school purpose acceptance score (Column B). A school purpose acceptance score was derived for each school by summing the ratings assigned by each school for the twenty-five purposes of vocational agriculture. This score permits the schools to be compared on the basis of the extent to which the total list of purposes was accepted as goals in the vocational agriculture programs of the schools. The score, however, does not take into consideration the relative importance of the purpose. To this extent, then, the score is independent of the operational aggregate derived for the school.

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[1] The objective, listed in Chapter I, supra, p. 4, to be treated in this chapter is:

(11). To ascertain the interrelationship among purposes, operations, and resources for programs of vocational agriculture.

[2] Supra, pp. 131-136.

TABLE VIII-1

TABLE OF SCORES FOR FOUR VARIABLES

Operational Aggregate	Purpose Acceptance Score	Resource Score	Use Score
1361	84	16.00	19
1332	116	14.17	14
1240	92	16.67	14
1191	98	13.33	15
1186	88	15.33	18
1160	83	14.17	19
1133	109	17.33	18
1123	90	14.33	14
1114	92	11.33	15
1062	105	13.17	19
1005	117	10.83	15
997	81	12.17	10
984	121	14.83	17
969	91	12.50	14
939	94	14.87	16
921	91	8.83	11
904	85	15.00	14
900	95	13.00	14
895	105	15.17	18
893	95	9.33	10
874	77	12.33	14
873	86	13.17	8
870	95	14.00	14
849	103	9.33	14
832	84	13.50	11
831	106	12.50	14
831	104	13.67	12
814	80	9.17	12
788	76	10.33	12
782	81	9.33	11
761	96	12.17	12
751	78	13.83	12
745	79	10.50	11
725	66	12.33	8
719	77	9.33	11
718	80	9.67	12
705	89	10.00	15
556	63	7.17	9
513	68	10.17	12
467	93	8.83	8
437	73	7.33	13

The reliability of the scores summed for schools was determined in the same manner as the reliability of the scores summed for items, as shown in Chapter IV.[3] For the data in Column B of Table VIII-1 the sum of squares between raters was calculated as 296.544, and, with 40 degrees of freedom, the mean square of raters (MS_R) was 7.414. The residual or error sum of squares was 602.773, and, with (41-1) (25-1) or 960 degrees of freedom, the mean square (MS_E) was .628. The reliability coefficient was determined by the formula:

$$r_{tt} = (MS_R - MS_E) / MS_R$$

which, in this instance, was (7.414 - .628) / 7.414, or .915.

A reliability coefficient of .915 is indicative that the ratio of error variance to variance which accrued from systematic ratings was minimal. The efficacy of the rating-scoring procedure is demonstrated further by applying an F test to the null hypothesis to the effect that random ratings were assigned by raters to items. Using the formula $F = MS_R/MS_E$, and substituting 7.414/.628, the value of F was computed as 7.81. With 40 and 960 degrees of freedom involved, the hypothesis was rejected at the .1 per cent level of significance. The results of these tests indicated that there was practically no possibility that random ratings were assigned to purpose items, but, rather, that systematic judgment was exercised in selecting numerical response categories.

The school purpose acceptance score, it should be noted, was taken as a measure of the extent of acceptance of the twenty-five purposes for vocational agriculture by the school raters, who included the high school principal and the vocational agriculture teacher in all instances, and, in a limited number of cases, the vocational director. A higher score indicated that the school raters tended to accept the list of purposes to a relatively great extent as goals in the vocational agriculture program, and a low score tended to indicate that this list of purposes was not accepted strongly by the school raters.

3. The material resource scores (Column C). The material resource scores shown on Column C of Table VIII-1 were obtained from ratings on Form 7A.[4] The scores were obtained by determining the average ratings for each school for the three facility items (classroom, shop, and

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[3] Supra, pp. 60-65. Cf. C. J. Hoyt and C. L. Stunkard. "Estimation of Test Reliability for Unrestricted Item Scoring Methods," Educational and Psychological Measurement, 12: 756-8, Winter, 1952.

[4] See infra, pp. A-34 ff.

laboratory facilities) shown in Table VI-15[5]; the three equipment items (classroom, shop, and laboratory equipment) shown in Table VI-17[6]; and the six teaching material items (general, technical, management, and mechanical reference materials, teaching outlines, and audio-visual aids) shown in Table VI-18[7]; then summing the three average ratings to procure an overall score for material resources.

In deriving the material resource score, it was assumed that within each of the three areas--facilities, equipment, materials--the individual items were of equal importance in contributing to the part scores. Then, it was further assumed that the three resource areas were of equal importance in deriving the material resource score. These assumptions appeared to be justified in light of the results of previous tests of significance reported in Tables VI-15, VI-17, VI-18, and VI-28.[8] Throughout the remainder of this chapter, the score so derived is referred to as the "resource" score.

4. The use of special service resources score (Column D). The data presented in Table VI-20[9] indicated that the use of privately-owned farms, school plots or farms, community talent and agencies and Future Farmers of America organizations all were significantly related to variations of operational aggregates. For the analyses in Chapter VIII, the ratings assigned on Form 7A for use of three of the four items (use of privately-owned farms, community talent and agencies, and Future Farmers of America) were summed to get a score indicative of the use made of special service resources. The use of school plots or farms was excluded from the analyses inasmuch as school plots or farms were provided in only thirteen schools. Thus, the use of special service resources scores was based on the areas in which the teacher was exercising imagination, initiative, and resourcefulness to make effective use of the three selected items. Again, it was assumed that the three items were of equal importance in deriving the use for special research scores. Hereafter in this chapter, the use of special resources score is referred to as the "use" score.

Product moment correlation coefficients between the pairs of the dichotomized variables were computed, and are shown in Table VIII-2.

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[5] Supra, p. 157.

[6] Supra, p. 160.

[7] Supra, p. 161.

[8] Supra, p. 176.

[9] Supra, p. 164.

The product moment correlation coefficients between the dependent variable, the operational aggregate, and the purpose, resource, and use scores, and between each pair of scores of these three independent variables ranged from .42 to .71. Inasmuch as a coefficient of .398 is significant at the 1 per cent level, with 41 pairs of ratings all coefficients differed significantly from zero.

TABLE VIII-2
INTERCORRELATIONS OF FOUR VARIABLES

Variable	Column	A	B	C	D
Operational aggregate	A		.49	.71	.63
Purpose acceptance score	B			.42	.49
Resource score	C				.60
Use score	D				

In terms of r^2, the proportion of the variance of one variable attributable to variation in the other variables, the range was from .1764 to .5098. Examination of the data reveals that in no instance did variations in purpose acceptance scores account for as much as one fourth of the variance in one of the other variables. The proportion of the variance attributable to variations in the other pairs of scores ranged from 36.00 to 50.98 per cent. Thus the data indicate a closer relationship among the resource, use, and operational measure than between the purpose acceptance scores and the other three measures. This trend, however, was not statistically significant.

II. ANALYSES OF OPERATIONS, PURPOSES, AND RESOURCES

The interrelationship among purposes, operations, and resources was analyzed further through a multiple analysis of variance technique. In this analysis the operational aggregate was the dependent variable and the school purpose acceptance, resource, and use scores were the independent variables. To study the main effects and interactions, the schools in the sample were dichotomized as follows:

1. Based on the purpose acceptance scores, the schools were divided into a "high" group of the twenty schools with scores of

TABLE VIII-3

ANALYSES OF VARIANCE OF OPERATIONAL AGGREGATES FOR VOCATIONAL AGRICULTURE, GROUPED ACCORDING TO PURPOSE ACCEPTANCE, RESOURCE, AND USE SCORES

Purpose acceptance scores								
High				Low				
Resource Scores				Resource Scores				
High		Low		High		Low		
High use	Low use	High use	Low use	High use	Low use	High use	Low use	
1332	831	1114	921	1361	873	874	997	
1240		1005	893	1186	832	705	814	
1191		969	761	1160	751		788	
1133		849	467	1123			782	
1062		831		904			745	
984							725	
939							719	
900							718	
895							556	
870							513	
							437	
EY 10546	831	4768	3042	5734	2456	1579	7794	
N 10	1	5	4	5	3	2	11	
$\bar{Y}$ 1054.600	831.000	953.600	760.500	1146.800	818.667	789.500	708.545	

Col.	A	B	C	D	E	F	G	H

Single Classification Analysis of Variance

Source of variation	df	Sum of squares	Mean Square	F	Hypothesis
Between sub-groups	7	1087449.92	155349.99	6.455	Rejected
Within sub-groups	33	794142.30	24064.92	—	($P \leq .001$)
Total	40	1881592.22			

Multiple Classification (2 x 2 x 2) Analysis of Variance

Source of variation	Combination			Effect	t	Hypothesis
Purpose	(A+B+C+D)	-	(E+F+G+H)	136.188	.537	Not rejected
Resource	(A+B+E+F)	-	(C+D+G+H)	638.922	2.519	($P < .05$)
Use	(A+C+E+G)	-	(B+D+F+H)	825.788	3.255	($P < .01$)
Purpose x Resource	(A+B+G+H)	-	(C+D+E+F)	259.922	1.167	Not rejected
Purpose x Use	(A+C+F+H)	-	(B+D+E+G)	7.612	.030	Not rejected
Resource x Use	(A+D+E+H)	-	(B+C+F+G)	277.678	1.095	Not rejected
Purpose x Resource x Use	(A+D+F+G)	-	(B+C+E+H)	216.678	.854	Not rejected

$$t = \frac{\text{effect}}{s_{\text{effect}}}, \text{ with 33 df}$$

$$s_{\text{effect}} = \sqrt{[24064.92] \left[\frac{1}{10} + \frac{1}{1} + \frac{1}{5} + \frac{1}{4} + \frac{1}{5} + \frac{1}{3} + \frac{1}{2} + \frac{1}{11}\right]} = 253.68$$

91 or higher, and a "low" group of the twenty-one schools with scores of 90 or lower.[10]

2. Based on the resource scores, the schools were divided into a "high" group of nineteen schools with scores of 13.00 or higher, and a "low" group of twenty-two schools with scores of 12.99 or lower.

3. Based on the use scores, the schools were divided into a "high" group of twenty-two schools with scores of 14 or higher, and a "low" group of nineteen schools with scores of 13 or lower.

Thus, eight sub-groups were formed, and these sub-groups are shown in Table VIII-3. A preliminary analysis was made using the single classification analysis of variance, to ascertain whether operational aggregates were independent of the sub-group in which the school was placed. An F value of 6.46 was obtained which, with 7 and 33 degrees of freedom, permitted the hypothesis to be rejected at the .1 per cent level of significance.

To test the influence of the three independent variables upon the operational aggregates, the sum of squares and the 7 degrees of freedom between the eight sub-groups were analyzed further into seven component parts, each part based upon a single degree of freedom. The results of the 2 x 2 x 2 analysis of variance are shown in Table VIII-3. The differences were computed for three main variables and for the four interactions. A "t" test was used to ascertain whether the differences were significant, with the standard error of effect determined by extracting the square root of the product of the mean square within sub-groups and the sum of the reciprocals of the number of schools in each sub-group. When the effects of resources and use were held constant, the scores for the high purpose schools did not differ significantly from the scores of the low purpose schools. When the effects of purposes and use were held constant, the difference between the scores of high resource schools and the low resource schools was significant at the 5 per cent level. When the effects of purposes and resources were held constant, the difference between the scores of the high use schools and the low use schools was significant at the 1 per cent level. None of the interactions was significant.

Although a significant correlation coefficient was obtained between operational aggregates and the purpose acceptance scores, when the effects of resources and use were controlled, the variable

acceptance failed to result in a difference between the means of the high acceptance groups and the low acceptance groups. This finding suggests that acceptance of purposes alone does not result in intensified operational activity, especially when adequate resources are not provided and extensive use is not made of special service resources.

Further analyses were made of the data to study the main effects of resources and use alone. Data were combined from Table VIII-3 to procure the data for Table VIII-4. Table VIII-4 shows the results of a double (2 x 2) classification analysis of variance technique applied to test the effects of resources and use and the interaction of resources x use.

The data show that there were fifteen schools in the high resource-high use sub-group, four schools in the high resource-low use sub-group, seven schools in the low resource-high use sub-group, and fifteen schools in the low resource-low use sub-group. Thus, it may be observed that resources and use tended to exist together. Thirty of the schools were placed in the same category for resources as for use, and the probability of this placement occurring by chance is less than one chance in 100.[10]

The hypothesis that the operational aggregates were independent of the sub-group in which the schools were placed was tested and rejected at the .1 per cent level of significance. Then the between sub-groups sums of squares was partitioned into three parts -- one part based on the difference between the two resource sub-groups, one part based on the difference between the two use sub-groups, and one part based on the interaction of the two variables. The results shown in Table VIII-4 confirm the results shown in Table VIII-3, except that where the difference between the two use sub-groups was significant at the 1 per cent level as shown in Table VIII-3, the difference was significant at the .1 per cent level when analyzed by the 2 x 2 design. The difference between the resource groups was significant at the 5 per cent level, and the interaction was not significant.

The means shown in Table VIII-4 prompted other considerations. First, the question may be raised as to whether school officials may obtain a significant increment in quality of instruction, as measured by the operational aggregate, by employing a teacher who by his initiative, imagination, and resourcefulness makes use of special service resources, and, hence, operates a quality program with inadequate

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[10] The hypothesis that the true distribution was an equal distribution with 10.25 schools in each cell when a distribution of 15-4-7-15 was obtained was rejected at the 5 per cent level of significance.

TABLE VIII-4

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE THE RELATIONSHIP OF OPERATIONAL AGGREGATES FOR VOCATIONAL AGRICULTURE, WHEN SCHOOLS ARE CLASSIFIED ACCORDING TO RESOURCES AND TO USE

	Classifications			
	High resources High use	High resources Low use	Low resources High use	Low resources Low use
Y	16280	3287	6347	10836
n	15	4	7	15
$\frac{n}{Y}$	1085.333	821.750	906.713	722.404

Analysis of Variance

Source of Variation	df	Sum of Squares	Mean Square	F	Hypothesis
Between groups	3	1012610.10	337537.37	14.37	Rejected
Within sub-groups	37	868910.12	23485.95	---	P < .001
Total	40	1881592.22			

Analysis of Main Effects and Interaction

Source of Variation	df	Sum of Squares	Mean Square	F	Hypothesis
Resources	1	146841.61	146842.61	6.25	P < .05
Use	1	381252.54	381252.54	16.22	F < .001
Resources x Use	1	11941.59	11941.59	.51	P > .05
With Sub-groups	37	868910.12	23485.95	---	---

resources. Secondly, there is the question of whether the provision of adequate resources alone is adequate to produce a significant increment in quality of instruction.

Examination of the data reveals that both high use with low resources and high resources with low use resulted in means greater than the means for the low resource-low use sub-group. Scheffe's test of significance for difference between pairs of means, based on unequal numbers in each sub-group, was applied to ascertain whether these increments were significant.[11] The results of tests were as follows:

1. The mean for the low resource-high use sub-group (906.713) did not differ significantly from the low resource-low use mean (722.404).

2. The mean for the high resource-low use sub-group (821.750) did not differ significantly from the low resource-low use mean (722.404).

3. The mean for the low resource-high use sub-group (906.713) did not differ significantly from the high resource-low use mean (821.750).

4. The high resource-high use mean (1085.333) did not differ significantly from either the high resource-low use mean (821.750) or the low resource-high use mean (906.713), but it did differ significantly at the .1 per cent level for the low resource-low use mean (722.404).

The average mean for the four sub-groups was 884.050. Thus the two high use sub-groups scored above this average mean, and the two low use sub-groups scored below the average. Moreover, the low resource-high use sub-group mean was above the average, and the high resource-low use mean was below the average. By linear contrast, the

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[11] A significant difference is obtained if $\bar{Y}_i - \bar{Y}_j$ is greater than

$$\sqrt{(K-1)F_a}\ \sqrt{s^2\left(\frac{1}{n_i}+\frac{1}{n_j}\right)},$$

where F_a is the 100 per cent point from the F distribution with $(k-1)$ and d f degrees of freedom. Cf. H. Scheffe, "A Method for Judging All Contrasts by the Analysis of Variance," Biometrika, 40: 87-104, June, 1953.

means were compared to ascertain which means differed significantly from the other three means.[12] The results of tests of significance follow:

1. The hypothesis that there was no difference between the mean of the high resource-high use sub-group (1085.33) and the average mean of the three other sub-groups (816.956) was rejected at the .1 per cent level of significance.

2. The hypothesis that there was no difference between the mean of the high resource-low use sub-group (821.750) and the average mean of the three other sub-groups (904.817) was not rejected.

3. The hypothesis that there was no difference between the mean of the low resource-high use sub-group (906.713) and the average mean of the three other sub-groups (876.496) was not rejected.

4. The hypothesis that there was no difference between the low resoucre-low use sub-group (722.404) and the average means of the other three sub-groups (937.932) was rejected at the .1 per cent level of significance.

Based on the results of these analyses, the data show that neither high use alone nor high resources alone is sufficient to result in a significant increment in quality of instruction. Rather the results of tests of significance show that to move in the direction of operating programs of vocational agriculture which manifest the previously identified conditions and trends, both adequate material resources and extensive use of special service resources are needed.

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[12] The linear contrast was determined by applying the formula

$$C = \sum C_i \bar{Y}_i$$

where the C_i are given numbers satisfying the restriction $\sum C_i = 0$. The standard error of a linear contrast is

$$s_c = \sqrt{s^2 \sum \frac{C_i^2}{n_i}}$$

Scheffe's test was applied to ascertain whether the contrast differed significantly from zero, and the attending hypothesis was rejected if $C > s_C \sqrt{K - 1 \; F_a}$, where F_a is the 100 a per cent point from the F distribution with (K - 1) and df degrees of freedom. Cf. J. A. Norton, Jr., "Simultaneous Significance Tests for Multiple Contrasts in the Analysis of Variance" (Mimeographed paper; Statistical Laboratory, Purdue University, Lafayette, Indiana) pp. 10-11; Scheffe, loc. cit.

Moreover, the data show that the teachers who were making intensive effort to operate a quality program without adequate resources were not able to overcome the handicap of inadequate resources, and that the provision of resources alone did not assure increments of quality.

SUMMARY OF CHAPTER VIII

Chapter VIII has explored the interrelationship among purpose acceptance, operational aggregates, and scores descriptive of (1) adequacy of material resources and (2) use of special service resources. Product moment correlation coefficients for six pairs of variables ranged from .42 to .69. In each instance, a hypothesis that the true correlation was zero was rejected at the 1 per cent level of significance. In terms of r^2, the proportion of the variance of one variable which is attributable to variation in a second variable, the range was from 17.65 per cent to 47.61 per cent. The purpose acceptance scores could not be described as effective predictors of the scores for the other three variables. Operational aggregates, resource scores, and use scores, taken individually accounted for 36 per cent or greater of the variation of the other two scores, also taken individually.

When data were analyzed by a multiple classification analysis of variance technique, with the operational aggregate treated as the dependent variable, and the purpose acceptance, resource, and use scores dichotomized into high and low groups and treated as independent variables, the results indicated that differences between the means of the high and low purpose acceptance groups were not significant, but the differences between the mean of the high and low resource groups and the high and low use groups were significant.

Analyses limited to the effects of resources and use on operational aggregates yielded differences which were significant at the 5 per cent level for resources, and at the .1 per cent level for use. Further analyses revealed that neither high resources nor high use alone was sufficient to produce a significant increment in quality of program. Both high resources and high use are essential to operating a program of vocational agriculture developed in response to the contemporary design for vocational agriculture.

CHAPTER IX

A SYNTHESIS OF THE ANALYSES OF PROGRAMS OF VOCATIONAL AGRICULTURE

Data presented in Chapters IV through VIII now are marshalled into a chapter which synthesizes the findings pertaining to vocational agriculture.[1] The chapter is divided into four sections: (1) the direction of program emphasis, (2) the direction of program operations, (3) the direction of program resources, and (4) the implementation of desired direction.

I. THE DIRECTION OF PROGRAM EMPHASIS

Section I of Chapter IX deals with the following question posed initially in the design of the research project, but paraphased slightly here:

> 1. To what extent do the purposes of vocational agriculture manifest the conditions and trends identified in Part I of the study,[2] as summarized in the contemporary design for vocational c ucation?

The Desired Direction

The study of vocational agriculture programs was initiated by the delineation and analysis of a list of twenty-five purposes of vocational agriculture. A score was assigned to each purpose, and the array of scores, as shown in Table IV-2[3], was taken to represent the relative importance of purposes in light of the contemporary design for vocational education.[4] Previously, in Chapter IV, attention was centered on a statistical analysis of the purpose scores, with special emphasis given to ascertaining the reliability of the rating-scoring procedure. Now attention is cast upon a content analysis of the purposes.

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[1] The following objective, listed in Chapter I, is treated in this Chapter:

(12). To analyze and synthesize findings to determine if possible direction and possible implications are suggested as meriting consideration in planning future pr_grams of vocational agriculture.

[2] F. J. Woerdehoff, N. J. Nelson, and J.K. Coster, "Vocational Education in Public Schools as Related to Social, Economic, and Technical Trends" (Mimeographed proposal, Division of Education, Purdue University, Lafayette, Indiana, February, 1958), p. 6 .

[3] Supra, p. 62.

The twenty-five purposes of vocational agriculture logically may be grouped into three major categories: (1) purposes pertaining to occupational proficiency, (2) purposes pertaining to occupational adjustment, and (3) purposes not readily classified, but tending to center in occupational appreciation. The purposes in the first category may be sub-divided into (a) purposes related to abilities of a scientific-managerial orientation, (b) purposes related to abilities centering in agricultural skills, and (c) purposes related to abilities associated with personal development. The third category may be sub-divided into (a) purposes related to appreciational abilities, and (b) a purpose related to abilities of an avocational nature.

The purposes subsumed under the three categories and the six sub-groups are shown in Table IX-1.[5] Table IX-1 also shows (1) the ranks assigned to each purpose by a jury of educational specialists for importance, and (2) the ranks assigned to each purpose based on mean operational scores, indicative of purpose emphasis. For purpose importance, the mean ranks for the six sub-groups are 4.8 for the seven scientific-managerial purposes, 14.7 for the three skills purposes, 9.5 for the three personal development purposes, 17.5 for the eight adjustment purposes, 18.0 for the three appreciational purposes, and 25.0 for the avocational purpose. For purpose emphasis, the mean ranks were 10.0 for the seven scientific-managerial purposes, 4.0 for the three skills purposes, 7.3 for the three personal development purposes, 18.1 for the eight adjustment purposes, 17.7 for the three appreciational purposes, and 24.0 for the avocational purpose.[6] On the basis of this content analysis, the following generalizations may be drawn:

1. There was evidence of a definite relationship between the order in which the purposes were scored and ranked for importance, and the trends which were judged to merit prime consideration in planning future programs of vocational education. Ranked high among the fifty-five trends identified and studied in Part I of the project were trends which referred to (1) the extension and expansion of the educational program, and (2) the upward extension of the level and nature of occupational activity. The vertical movement of the occupational structure is reflected in the relative

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[4] Supra, pp. 24-25.

[5] For a listing of the purposes to which the numbers refer, see Form 5, infra, pp. A-13 ff.

[6] The Kruskal-Wallis one way analysis of variance of ranks test was applied to ascertain whether the ranks were drawn from a common population. The attending null hypotheses for importance and emphasis were rejected at the 2 per cent or greater level of significance. Cf. S. Siegel, Nonparametric Statistics for the Behavioral Sciences (New York: McGraw-Hill Book Co., Inc., 1956), pp. 189-93.

TABLE IX-1

RANKS ASSIGNED TO PURPOSES FOR PURPOSE IMPORTANCE AND OPERATIONAL SCORES (EMPHASIS), FOR VOCATIONAL AGRICULTURE, SHOWING MEAN RANKS FOR SIX PURPOSE SUB-GROUPS

Purpose Categories																				
Occupational proficiency										Occupational adjustment			Occupational appreciation							
Scientific-managerial			Skills			Personal development							Appreciational			Avocational				
	No.	Imp.	Emp.	No.	Imp.	Emp.	No.	Imp.	Emp.		No.	Imp.	Emp.		No.	Imp.	Emp.	No.	Imp.	Emp.
A	1	2		5	11	8	6	7.5	11		23	5	19		18	15	22		16	25	24
	4	1	2		5	11	8		6	7.5	11		23	5	19		18	15	22		16	25	24
	20	2	10		10	16	3		8	9	4		19	13	20		1	19	14				
	13	3	5		12	17	1		3	12	7		7	14	18		9	20	16				
	11	4	6										17	18	21								
	25	6	23										24	21	13								
	2	7.5	9										15	22	12								
	22	10	15										21	23	17								
													14	24	25								
ΣX		33.5	70		44	12		28.5	22		140	145			54	52			25	24			
N		7	7		3	3		3	3		8	8			3	3			1	1			
X̄		4.8	10.0		14.7	4.0		9.5	7.3		17.5	18.1			18.0	17.3			25.0	24.0			

importance of purposes related to the scientific-managerial aspects of agriculture, as compared with the purposes pertaining to agrarian skills. The development of managerial behavior, apparently, is prized as highly in agriculture as in other facets of the occupational structure.

2. Specialized purposes pertaining to occupational proficiency, generally, ranked higher in importance than the more general purposes of vocational agriculture. The data in Table IX-1 show that, as a general pattern, the specialized purposes pertaining to occupational proficiency ranked highest in importance, and that the relative importance of the purposes diminished as the purpose sub-groups became more general in nature.[7] This finding suggests that neither a broad, general educational program emphasizing general facts and principles, nor a relatively narrow program emphasizing agrarian skills is appropriate in planning contemporary programs of vocational agriculture. Rather, the data indicate that a socially adapted program is one of sufficient depth and breadth to engender the development of specialized abilities, with emphasis on helping students understand the "why" of action as well as to perform the "how."[8]

3. The scoring of the purposes selected for the study was such that all twenty-five purposes of vocational agriculture merit attention in planning educational programs. Although the purposes pertaining to occupational proficiency, particularly those related to the high level scientific-managerial aspects of agriculture, scored highest in importance, examination of mean ratings assigned to the purpose items, as shown in Table IV-4, reveals that no purpose item was rated lower than "moderate"

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[7] Supra, pp. 14-21.

[8] This finding facilitates the clarification of the concept regarding the nature of vocational education, as was reported in Part I of the study. The antithesis of a program emphasizing simple skills and related knowledge is not necessarily a broad general program of education, toward which a relatively large proportion of specialists in education and allied fields would have vocational education move. Instead, these data tend to indicate that the antithesis is a broad specialized program which emphasizes the higher level abilities related to occupational proficiency. The generalized purposes, especially those pertaining to appreciation, ranked relatively low in importance. Cf. F.J. Woerdehoff, N.J. Nelson, and J.K. Coster, Vocational Education in Public Schools As Related to Social, Economic, and Technical Trends: Part I. The Analysis of Trends and Concepts (Studies in Education, No. 1; Lafayette, Indiana: Purdue University, Division of Education, 1960), pp. 31-37; W.K. Bugher, "An Evaluation of the Superintendent's Concept of and Impact on Selected Aspects of Vocational Programs (unpublished Doctor's dissertation, Purdue University, Lafayette, Indiana, 1960), pp. 64-68.

importance,[9] and that the majority of items was rated "considerable" importance or higher. The importance of all purposes is such that attention may be given to instituting enrichment programs and exploratory courses designed to facilitate the attainment of purposes related to occupational adjustment and occupational appreciation. The latter may be added as an enrichment phase of established core courses. The former may be incorporated, partially at least, in an exploratory vocational program. If this is done, then the emphasis on the occupational proficiency purposes may be shifted to the upper secondary years, and to post-high school instructional programs.

The Existing Situation

If it may be presumed that the hierarchy of purposes manifests the conditions and trends identified in Part I of the study, then the data show that the persons responsible for programs of vocational agriculture in the selected sample were tending to accept and emphasize purposes in accordance with the hierarchy of purposes. Scores indicative of the extent to which school raters accepted the purposes as goals of the program correlated significantly with the scores assigned by the jury for importance. And the order of emphasis, as denoted by the mean operational scores presented in Chapter V was in substantial agreement with the order of importance of the purposes.

Statistical analyses of the order of emphasis, as compared with the order of importance, are presented in Tables V-5[10] and II-1. The data in Table V-5 indicate that there was agreement between purpose importance and purpose emphasis for the majority of purposes. It was noted, however, that the schools were tending to place more emphasis on the relatively simple mechanical, manipulative, and identification skills (Purposes Nos. 10 and 12) than the relative importance of these purposes would seem to justify. And, concomitantly, the schools were placing less emphasis on the purposes related (1) to applying the scientific method to agriculture (No. 25), and (2) to helping established farmers adjust to changing conditions in agriculture (No. 23) than the relative importance of these purposes would seem to suggest.[11]

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[9] Mean ratings of 1, 3, 5, 7, 9 are taken to denote no, limited, moderate, considerable, and very great importance. See rating schedule used by jury, Form 11, infra, pp. A-60 ff.

[10] Supra, p. 108.

[11] Ibid.

When the ranks assigned for purpose emphasis, grouped according to six sub-groups, are examined, the data show that the pattern for emphasis in Table IX-1 is quite similar to the pattern for importance. The major exception to this pattern occurs within the category of occupational proficiency. Whereas the jury rated the scientific-managerial purposes higher than the skills purposes, the order for emphasis was the reverse.

The Future Direction

Not much change is indicated in the programs of vocational agriculture studied to bring the purposes as currently accepted and emphasized into agreement with contemporary conditions and trends. The order in which purposes were accepted as goals of the program was in closer agreement with contemporary conditions and trends than the order in which purposes were emphasized, although this trend was not statistically significant.[12] The alteration of direction may be summarized in the following four points:

1. Increased emphasis should be given to the scientific-managerial purposes, with special attention to applying the products of scientific thought and practice to practical agriculture situations.

2. Increased attention should be given to programs designed to help persons become established in (Purposes Nos. 19 and 14) and adjust to changing conditions (Purpose No. 23) in agricultural occupations.

3. The emphasis on purposes pertaining to relatively simple mechanical, manipulative, and identification skills should be re-examined, and, possibly, brought into closer proximity with occupational reality. The relative importance of these purposes is not to be minimized---certainly they are not to be ignored. But these purposes lend themselves to contest activity and other motivational and quasi-motivational techniques, and it is entirely possible that the glamour associated with these activities has resulted in a climate which has tended to place the importance of these activities out of focus with the reality of occupational requirements in modern agriculture.

4. Although the three categories mentioned at the beginning of this section--occupational proficiency, adjustment, and appreciation--cannot be divorced entirely from each other, thought should be given to

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[12] The product moment correlation coefficient between purpose emphasis (denoted by mean operational scores) and scores assigned by school raters for acceptance was .68, whereas the coefficient between emphasis and purpose importance was .53.

developing educational programs which would place some phases of the program in pre-vocational, exploratory phases of the program, to extending the length of the exploratory phase, and to concentrating on occupational proficiency in the upper secondary years and post high school or adult education programs. The complexity of modern agriculture suggests that many of the purposes related to occupational proficiency, especially the scientific-managerial purposes, are more appropriate for the mature secondary student than for beginning high school students. Then, too, the trend to increase vocational education at the adult level is as applicable to agriculture as to other fields.

II. THE DIRECTION OF PROGRAM OPERATION

Section II deals with the following question taken from the original proposal:

> 2. To what extent are the operations for programs of vocational agriculture adequate for programs designed in response to the contemporary design for vocational education?[13]

The Desired Direction

The desired direction of operations in vocational agriculture may be determined by a review and analysis of the data presented in Tables V-1 and V-2.[14] Three levels of operation were delineated for each of the twenty-five purposes, and the instructional activities characteristic of each level were appraised in light of the contemporary design for vocational education. The levels of operation for each purpose were designated Levels A, B, and C. The activities characteristic of Level of Operation A are those centered in study and discussion type activities in the classroom, shop and laboratory, which require limited physical resources and which provide limited direct experiences for the student. The activities characteristic of Level of Operation C are, generally, those which provide for extensive student participation, and, which, in many instances, require extensive physical resources. Level B activities range between Levels A and C.

On the basis of the ratings assigned to each level of operation as shown in Table V-1, and the mean ratings for each level of operation for

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[13] Moerschoff, Nelson, and Coster, "Vocational Education in Public Schools as Related to Social, Economic, and Technical Trends," loc. cit.

[14] Supra, pp. 81-93 and p. 96.

the twenty-five purposes as shown in Table V-2, the following generalizations may be made:

1. There was evidence of a definite relationship between the ratings assigned to three levels of operation for educational value and the order in which the trends were scored and ranked as meriting consideration in planning future programs of vocational education. Closely associated with the direction of purpose emphasis, based on the content analysis of the purposes, is the direction of program operation, based on the analysis of levels of operation as discussed in Section I of Chapter V. Not only do the data point to the need for intensifying the content of instruction, consistent with the constant upgrading (vertical movement) of activity in agricultural occupations, but, fully as important, the findings point to concurrent intensification and extension of operational procedures. Thus, an essential continuity between content -- as suggested by the purposes -- and methodology -- as suggested by operations was demonstrated. The broad societal trends which gave direction to purpose emphasis, particularly in emphasising the relative importance of the scientific-managerial purposes as contrasted with the skills purposes, also point to the need for altering program operations. Relatively simple operations are to be augmented by a complex of learning activities, which provided amply for directed student experiences and self-directed discovery activities.

2. There was evidence that programs of vocational agriculture which limit instruction to Level A type activities are not meeting the demands of educational programs brought about by changing conditions in society. On the average, according to the data in Table V-2, the schools which limit operations to level A activities would receive an operational score of only 34.2 percent of the maximum score available to the schools. To be truly effective in operating socially adapted programs of vocational agriculture, some activity at Levels B and C is needed. Moreover, the relatively amount of activity at Levels B and C should be increased as purposes increase in importance.

The Existing Situation

If it may be presumed that a prime indication of program operation consistent with the identified conditions and trends is the relative amount of emphasis at Levels B and C, then the data presented in Chapter V demonstrated that the programs of vocational agriculture in the 41 school sample were tending to operate programs consistent with the contemporary design for vocational education. Data in Table V-4[15] show that 52 per cent of the average mean operational scores was attributable to operations at Levels B and C. Further evidence of the extensiveness of operation may be obtained by comparing the mean operational aggregate

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[15] Supra, pp. 103-105

for the 41 schools with the maximum operational aggregate that could be obtained by maximum operation at Level A only. The mean operational aggregate was 896.34,[16] and the maximum operational aggregate for Level A is 640.[17] With $\bar{X}$ = 896.34, s = 214.22, and $s_{\bar{x}}$ = 33.46, the hypothesis that the mean of the population is 640 is rejected at the .1 per cent level. Thus, there is practically no possibility that the programs of vocational agriculture in Indiana were restricting their operations to Level A activities.

Data presented in Table V-4 were analyzed to ascertain the extent to which operational activity at Levels B and C was directed toward the more important purposes. The purposes were ranked according to the per cent of the mean operational score for each purpose that was attributable to operation at Levels B and C. As might be expected, the rank order correlation between ranks based on per cent of mean operational score attributable to operations at the higher levels and the ranks of purposes based on mean operational scores was relatively high, .78. This may be compared with a rank order coefficient of .27 between the ranks of purposes according to importance and the proportion of the operational scores attributable to activity at Levels B and C.

The average ranks for the six sub-groups for 1 th purpose importance and proportion of activity at Levels B and C are shown in Table IX-2.[18] The highest proportion of activity was for the skills purposes, followed closely by the personal development purposes. The scientific-managerial purposes ranked higher than the remaining three sub-groups; however, the difference between mean ranks of the skills purposes and the scientific-managerial purposes was slightly greater when proportion was compared with importance than when emphasis was compared with importance.

The Future Direction

The major shift suggested by the foregoing analyses is to intensify operations at Levels B and C for the scientific-managerial purposes. True, the mean ratings assigned to many of these purposes, as shown in Column f of Table V-4, were relatively high. But the

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[16] See supra, p. 135.

[17] This value was computed by squaring each purpose factor, multiplying the square by the maximum operational score available for Level A, as shown in Table V-1, summing the cross products, and rounding to the desired number of digits.

[18] The hypothesis that the ranks were drawn from a common population was rejected at the 2 per cent level of significance, according to the Kruskal-Wallis H-test. Cf. Siegel, loc. cit.

TABLE IX-2

RANKS ASSIGNED TO PURPOSES FOR PURPOSE IMPORTANCE AND PROPORTION OF OPERATIONAL ACTIVITY ATTRIBUTABLE TO OPERATIONAL LEVELS B AND C FOR VOCATIONAL AGRICULTURE, SHOWING MEAN RANKS FOR SIX PURPOSE SUB-GROUPS

Purpose Categories																	
Occupational proficiency									Occupational adjustment			Occupational appreciation					
Scientific-managerial			Skills			Personal development						Appreciational			Avocational		
No.	Imp.	Pro.	No.	Imp.	Pro.	No.	Imp.	Pro.	No.	Imp.	Pro.	No.	Imp.	Pro.	No.	Imp.	Pro.
4	1	6	5	11	5	6	7.5	9	23	25	20.5	18	15	20.5	16	25	25
20	2	16	10	16	1.5	8	9	4	19	13	22	1	19	9			
13	3	7	12	17	1.5	3	12	3	7	14	18	9	20	23			
11	4	14							17	18	17						
25	6	19							24	21	24						
2	7.5	11.5							15	22	13						
22	10	9							21	13	11.5						
									14	24	15						
ΣX	33.5	82.5		44	8		28.5	16		140	141		54	52.5		25	25
N	7	7		3	3		3	3		8	8		3	3		1	1
X	4.8	11.8		14.7	2.7		9.5	5.3		17.5	17.6		18.0	17.5		25.0	25.0

relative importance of the purposes in relation to socially adapted programs of vocational agriculture allude to further intensification of activity at the higher levels, expecially for the purposes pertaining to the application of scientific method to agriculture (Purpose No. 25), farm organization and management (No. 20), and the marketing of farm products (No. 11).

In addition, shifts are indicated for the purposes pertaining to adjusting to changing agricultural conditions (Purpose No. 23) and becoming established in farming (No. 19). At present, according to the data, the major activity is limited to conducting classes for persons engaged in these phases of adjustment. Especially for a purpose ranked as high in importance as is No. 20, it would seem that more intensified operation at Level B (which provides for individual consultation), and possibly at Level C (which provides for intensive courses) are appropriate.

Although resources are to be discussed more fully in the next section, it may be noted here, parenthetically, that the provision of material resources and the use of special service resources, as were discussed in Chapters VI and VII, undoubtedly are related to the purposes which ranked highest in terms of proportion of operational activity at the higher levels. Not all schools provided shops for vocational agriculture, but the fact that 32 of the 41 programs had access to shop facilities made it possible for teachers to extend operations to Level B, and, to some extent, to Level C. This partially accounts for the relatively high proportion of activity at the higher-levels for Purposes Nos. 5 and 10. The use of the Future Farmers of America organization, as a special service resource, probably contributed to activity at the higher levels for Purpose Nos. 3, pertaining to the development of leadership and citizenship traits, and 8, pertaining to traits essential for success in an occupation. The use of privately- or school-owned farms, in providing for directed experience, through supervised farming programs, quite possibly was related to the relatively high activity at Levels B and C for Purposes Nos. 4, which pertains to applying technical knowledge to the solution of farm problems, and 12, which pertains to manipulative and identification skills involved in farm production. These observations support, albeit somewhat subjectively, the hypothesis that more intensified operation at Levels B and C for other purposes may be restricted by somewhat inadequate resources or limited use made of available resources. If this hypothesis is true, then program operation for a socially adapted program may become a function of defining the resources needed for such a program.

III. THE DIRECTION OF PROGRAM RESOURCES

Section III deals with the following three questions stipulated

in the original proposal:

3. To what extent are the resources for offering vocational agriculture adequate for socially adapted programs?

4. To what extent are resources, purposes, and operations of programs of vocational agriculture inter related?

5. To what extent do schools vary in operations and resources when grouped according to selected school and community variables?[19]

The data on which the synthesis in the present section is based were presented in Chapters VI, VII, and VIII. Purpose scores, as presented in Chapter IV, and operational scores, as presented in Chapter V, were combined to obtain for each school an operational aggregate. The operational aggregate was defined as the summation of the operational emphasis and effort put forth to attain each purpose, modified mathematically according to the relative importance of the purpose. The position of a given school on the operational aggregate continuum, in relation to other schools, was taken as an indication of the extent to which the program was being operated in accordance with the contemporary design for vocational education. Once the operational aggregate measure was determined for the schools in the sample, the investigative problem became one of studying the relationship between a multiplicity of independent variables -- which included selected lists of material and human resource variables -- and the dependent variable, the operational aggregate. Having determined that a relatively large number of material resource variables were related significantly to variations in operational aggregates, then the resource variables themselves were studied to ascertain whether school and community variables could be identified which accounted for variation in the resource items. Lastly, in Chapter VIII, additional statistical tests were applied to study the interrelationship among purposes, operations, and resources.

The Desired Direction

The array of operational aggregates shown in Table VI-2 demonstate amply that there was wide variation in the extent to which programs of vocational agriculture in the selected sample were manifesting contemporary societal conditions and trends. The distribution of aggregates approximated a "normal" distribution, with a range from 437 to 1361, a mean of 896.34, and a standard deviation of 214.22[20]. The

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[19]Woerdehoff, Nelson, and Coster, "Vocational Education in Public Schools as Related to Social, Economic, and Technical Trends," loc. cit.

[20]Supra, p. 135

study of material and human resources and of school and community variables was directed toward identifying sources of variation. The assumption here was that by identifying variables which statistically distinguished programs that ranked high in social adaptability and those that ranked lower, the results could be projected to point the direction to future development which may bring about increased increments in quality of instruction as related to program demands. The results of the analyses support the following generalizations:

1. The constant upgrading of the occupational structure pertaining to agriculture necessitates the constant upgrading of material resources. The availability and suitability of material resources may not assure the operation of a socially adapted program of vocational agriculture. But the results of tests of significance applied to determine relationship between selected material resource variables, including three facility variables, three equipment variables, and six teaching materials variables, demonstrated a significant relationship for ten of the twelve variables, and a near significant relationship for the other two. The correlations of the twelve independent variables with the dependent variable, the operational aggregate, ranged from .347 to .620, according to the data in Table VI-28[21]. When the ratings for the three categories of variables were averaged, and the averages summed for each program, the correlation between the score so derived and the dependent variable was .714.[22] A projection of the resource score from the obtained mean for the sample of 12.219, based on the data presented in Table VIII-1,[23] to a maximum mean of 21, the maximum score, is shown in Table IX-3. The projection, based on a regression line of the operational aggregate on the resource score, assuming both linearity of relationship and homoscedasticity, indicates that for a mean resource score of 21, the best estimate for the operational aggregate is 1424. Since the critical region at the 5 per cent level of significance for the operational aggregate, with $n = 41$, $\bar{X} = 896.34$, and $s = 214.22$, is less than 828.73 and greater than 963.95, there is little or no question that this best estimate of 1424 represents a significant increment in quality of instruction above existing operation. Even if the mean resource score were increased to 15, which, according to scoring procedures used, would represent an average rating of adequate for the twelve items, as applied on Form 7A,[24] the best estimate of the operational aggregate would be 1064, also a significant increment.

The findings with reference to material resources denote that lack

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[21] Supra, p. 176.

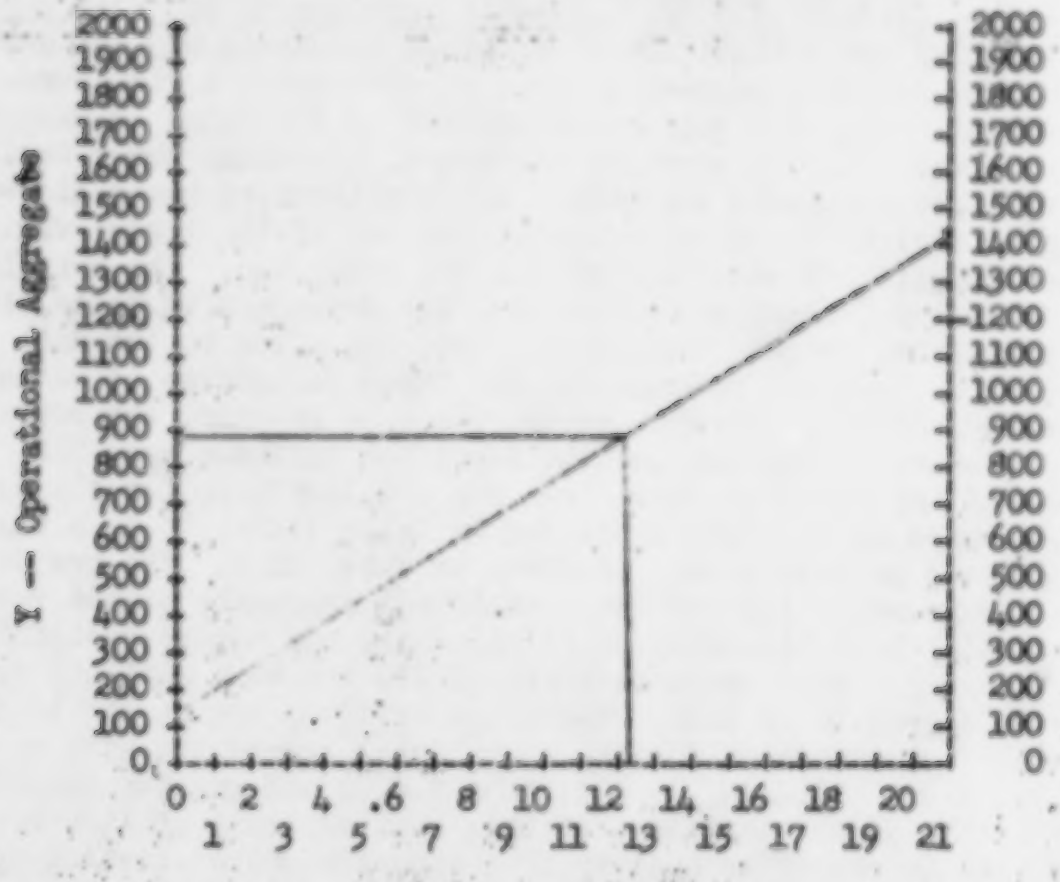
[22] See Table VIII-2, supra, p. 205.

[23] Supra, p. 202.

[24] Infra, pp. A-34 ff.

TABLE IX-3

REGRESSION OF OPERATIONAL AGGREGATE ON RESOURCE SCORE FOR VOCATIONAL AGRICULTURE



$\Sigma Y = 36750$ $\Sigma X = 500.98$

$\Sigma Y^2 = 34822144$ $\Sigma X^2 = 6387.05$

$\bar{Y} = 896.34$ $\bar{X} = 12.219$

$\Sigma XY = 465007.04$

$Y_i = 161.87 + 60.11 X_i$

$t = 60.11 / 9.445 = 6.36$, with df = 39

of adequate resources limit the effectiveness of operation, and, in effect, tend to restrict the scope of operation to the type of instructional activities suggested by Level of Operation "A". Concomitantly, the findings tend to demonstrate that the operation of programs designed in response to societal conditions and trends in contingent upon the adequacy of resources provided to operate the programs. The broad societal trends which have brought about changes in the occupational structure, and which have engendered alterations in program operations, also have modified the resource requirements for program operation. Hence it may be concluded that if schools are in manifest, and even redirect, societal changes related to agricultural occupations, the wherewithal for the doing must parallel the occupational demands.

2. The direction of program emphasis and program operation points to increasing emphasis on the effective use of school and community special service resources. Analyses of the data presented in Chapters VI and VIII have yielded information to support the thesis that socially adapted programs of vocational agriculture are those which are characterized by the availability of adequate physical resources, and the employment of a teacher who, by his imagination, initiative, and resourcefulness, makes effective use of special service resources readily available in the school and community.

Traditional measures of teacher competency, such as training and experience, failed to show a significant relationship to program operation, although there was an indication that some graduate work in either professional or technical areas resulted in significant increments in quality of instruction. The best indication of a relationship between the teaching personnel and variation in operational aggregates, however, was centered in the extent to which community resources, farm facilities, and student organizations were used in attaining the purposes selected for the study. The relationship between these special service resources and operation at higher levels was alluded to in Section II of this chapter. The study of agricultural trends in the community, state, nation, and world; the use of demonstrations and experimentations in the instructional program; the application and pragmatic tests of agricultural facts and principles to practical occupational situations; and the development of desirable personal traits associated with success in the occupation give rise to the need and desirability for making use of these special resources.

Results of tests of significance presented in Table VI-20[25] indicated that four items were related significantly to variations in operational aggregates. The correlations between the ratings assigned to these four items and the operational aggregates ranged from .334 to

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[25] Supra, p. 164

.630, according to data presented in Table VI-28. The ratings of three of these items -- use of community talent and agencies, privately owned farms for directed experience, and the Future Farmers of America organization -- were summed to procure a use score for each school. The correlation between the use score and the operational aggregate was .631.[26] A projection of the use scores from the obtained mean for the sample of 13.39, based on the data presented in Table VIII-1, to a mean of 21, the maximum score denoting very extensive use of each of the three items, is shown in Table IX-4. For a mean use score of 21, assuming both linearity of relationship and homoscedasticity, the best estimate of the operational aggregate is 1242. For a mean of 15, indicating considerable use of the three items, on the average, the best estimate for the operational aggregate is 969. In both instances, the projected mean for the operational aggregates is significantly greater than the obtained mean of 896.34.[27]

The findings with reference to use of special service resources suggest that the teacher who limits his instructional operations to teacher directed activities centered in the classroom, shop, or laboratory may find it somewhat difficult not only to operate a vocational type

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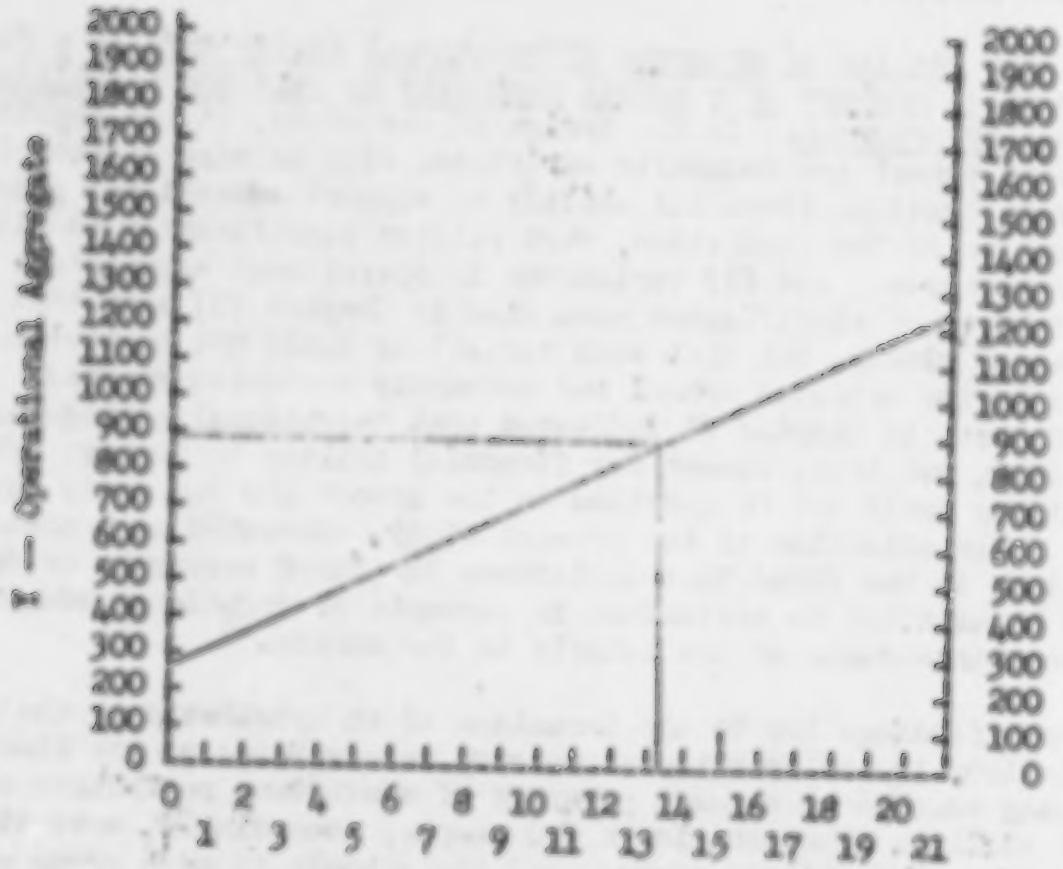
[26] See Table VIII-2, supra, p. 205

[27] Interpretation of the data presented in "1" and "2" should take into consideration the relatively high relationship between resource scores and use scores. The product moment correlation coefficient is .60, and the corresponding "b" value for the regression of use scores on resource scores is significant at the .1 percent level. Using a regression equation, the best estimate of a use score for a resource score of 21 is 19.6. A partial correlation for operational aggregate and resource scores of .54 was obtained when the effect of use was removed, and a partial correlation of .36 was obtained for operational aggregate and use scores when the effect of resource scores was removed. The multiple correlation ($R_{o.\,ru}$) was .76 indicating that 57.5 per cent of the variance of the operational aggregates could be accounted for by the combined effect of the resource and use scores. The projections shown in Tables IX-3 and IX-4 are, therefore, based on the assumption that the intercorrelation of resource scores and use scores will prevail. If the use score were held constant at the obtained mean of 13.39, and resource scores were projected to 21, the best estimate of the operational aggregate would be 1280. If the resource score were held constant at the obtained mean of 12.219, and the use score projected to21, the best estimate for the operational aggregate would be 1068. The projection of both use and resource scores to a maximum score of 21 each would give a best estimate for the operational aggregate of 1451. Cf. E.F. Lundquist, Statistical Analysis in Educational Research (Boston: Houghton Mifflin Co., 1940) pp. 248-56.

TABLE IX-4

REGRESSION OF OPERATIONAL AGGREGATE ON USE SCORE
FOR VOCATIONAL AGRICULTURE



$\Sigma Y = 36750$ $\Sigma X = 549$

$\Sigma Y^2 = 34822144$ $\Sigma X^2 = 7715$

$\bar{Y} = 896.34$ $\bar{X} = 13.39$

$\Sigma XY = 508600$

$Y_i = 288.64 + 45.38 X_i$

$\hat{t} = 45.38 / 8.933 = 5.08$, with df = 39

program, but, also to operate a socially adapted program. The use of a student organization, such as the local chapter of the Future Farmers of America, for example, facilitates and enhances operations at the higher levels to attain purposes related to personal development. But the projection of future direction, as denoted by the slope of the regression line, it should be pointed out, is based on the assumption that the special service resources will be used prudently and with insight, caution, and purpose.

3. The quality of programs of vocational agriculture is a function of the desire of members of a school community to want and be willing to support quality programs. In the design of the study, it was hypothesized that selected school and community variables, such as size of school, geographical location, financial ability to support educational programs, and composition of the population, were related significantly to (1) variations in resources, and (2) variations in operational aggregates. The results of tests of significance presented in Chapter VII show that resources varied widely, but that such variations could not be ascribed to variations in the selected school and community variables studied. The results of tests in Chapter VI indicated that operational aggregates varied widely, but that, except for financial ability to support education, the variations could not be ascribed to the school and community variables studied. In an extension of the present study, conducted as a doctoral dissertation, it was found that variations in either resources or operations could not be ascribed to variations in concepts of vocational education held by superintendents of the schools in the sample.[28]

These findings led to the formation of an hypothesis to the effect that variations in the operational measure were related to the financial effort being exerted to support programs of education, regardless of financial ability. The schools in the sample, accordingly, were divided into three financial ability groups, and the schools in each group were classified as "high effort" or "low effort" schools. The effort groupings were based primarily on (1) financial ability to support education, (2) the tuition tax rate, and (3) salaries paid to vocational agriculture teachers in excess of state minimums.[29] When the six sub-group means were studied by a 2 x 3 double classification analysis of variance design, it was found that the difference ascribable to effort was significant at the 1 per cent level, that the difference ascribable to financial ability was significant at the 5 per cent level, and that interaction of effort and financial ability was not significant.[30]

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[28]Bugher, op. cit.

[29]Cf. supra, pp. 143-150

[30]See Table VI-10, supra, p. 149

Analyses of the main effects of financial ability and effort on resource and use scores, and the appropriate interactions, have been made and are reported in Tables IX-5 and IX-6, respectively. In these analyses, however, a 2 x 2 design was used. The schools were divided into 20 high ability schools, with assessed valuation in excess of $7500 per enrolled pupil, and into 21 low ability schools with assessed valuation per enrolled pupil less than $7500. Of the 23 high effort schools, eight were in the high ability group, and 15 were in the low ability group. Twelve of the 18 low effort schools were in the high ability group, and six low effort schools were in the low ability group. The hypothesis that the resource scores were independent of the four sub-groups was rejected at the .1 per cent level of significance. When the main effects and interaction were studied, the difference ascribable to effort was significant at the .1 per cent level, the difference ascribable to ability was significant at the 5 per cent level, and the interaction of effort and ability was not significant, according to the data in Table IX-5.

In analyzing the use scores, it was found that the hypothesis that the use scores were independent of the four sub-groups was not rejected, according to the data in Table IX-6. When the main effects and interactions were studied, however, it was found that the difference ascribable to effort was significant at the 5 per cent level, whereas the difference ascribable to ability and the interaction of effort and ability were not significant.

In generalising from these data, it should be pointed out that other intervening school and community variables not investigated in this study may have had some influence on the operational measure. Moreover, there are indications that the financial wealth of the community was a variable related to variation in the operational measure, even when the effect of effort was controlled. But in view of the powerful influence of effort, especially with reference to the use score, there appears to be ample evidence to support the conclusion that desire as indicated by effort is a variable significantly related to variations on quality of programs, to the resources provided to operate the programs, and, perhaps, most importantly, to the extent to which the teacher exercised initiative, industry, and resourcefulness in making use of the special service resources previously defined.[31]

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[31] A cause and effect relationship, however, is not established. These data do not answer the question of whether employing officials in high effort schools apply criteria in teacher selection that identify teachers who, as a group, would tend to score high in the use scale, or whether the educational climate in communities ranked high in effort operates to encourage the initiative, imagination, and resourcefulness of teachers which results in high use scores.

TABLE IX-5

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE THE RELATIONSHIP BETWEEN RESOURCE SCORES FOR VOCATIONAL AGRICULTURE, AND THE MAIN EFFECTS OF FINANCIAL ABILITY AND EFFORT

Classifications

	High ability High effort	High ability Low effort	Low ability High effort	Low ability Low effort
$\sum X$	120.99	130.81	187.01	62.17
N	8	12	15	6
$\bar{X}$	15.124	10.901	12.467	10.362

Analysis of Variance

Source of variation	df	Sum of squares	Mean square	F	Hypothesis
Between sub-groups	3	109.975	36.658	8.73	Rejected
Within sub-groups	37	155.344	4.198		$P < .001$
Total	40	265.319			

Analysis of Main Effects and Interaction

Source of variation	df	Sum of squares	Mean square	F	Hypothesis
Effort	1	84.029	84.029	20.82	$P < .001$
Financial ability	1	23.127	23.127	5.57	$P < .05$
Effort x ability	1	10.157	10.157	2.42	$P > .05$
Within sub-groups	37	155.344	4.198	---	

TABLE XI-6

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE THE RELATIONSHIP BETWEEN USE SCORES FOR VOCATIONAL AGRICULTURE, AND THE MAIN EFFECTS OF FINANCIAL ABILITY AND EFFORT

Classifications

	High ability High effort	High ability low effort	Low ability High effort	Low ability low effort
$\sum X$	122	144	206	77
n	8	12	15	6
$\bar{X}$	15.250	12.000	13.733	12.833

Analysis of Variance

Source of variation	df	Sum of squares	Mean square	F	Hypothesis
Between sub-groups	3	54.489	18.163	2.17	Not rej.
Within sub-groups	37	309.267	8.359		$P > .05$
Total	40	363.756			

Analysis of Main Effects and Interaction

Source of variation	df	Sum of squares	Mean square	F	Hypothesis
Effort	1	38.994	38.994	4.67	$P < .05$
Financial ability	1	1.060	1.060	.13	$P > .05$
Effort x ability	1	12.504	12.504	1.50	$P > .05$
Within sub-groups	37	309.267	8.359		

The Existing Situation

The status of resources has been described in Chapter VII, and the relationships between two resource measures -- the resource score and the use score -- have been analyzed in Chpter VIII. Hence, the present subsection is reduced to two further generalizations pertaining to the analysis of resources in the 41 school sample:

1. The resources available or used in programs of vocational agriculture varied widely. Since both the adequacy of material resources and the use of special service resources have been shown to be related closely to variations in the operational measure, it is logical to surmise that variations very likely would be evident in the extent to which schools offer programs of vocational agriculture which manifest the previously identified social, economic, and technical trends as long as resources are permitted to vary. True, some variation is to be expected. Indeed, for a large sample of schools, a distribution of resource scores probably would approximate a normal distribution. In the instance of the present sample, however, the resource scores ranged from 7.17 to 17.33. The rating procedure used on Form 7A transformed the range to 2.39 to 5.78, or from very inadequate to adequate. The semi-interquartile range in terms of resource scores was from 9.83 to 14.08, and terms of average ratings on Form 7A was from 3.28 to 4.69.

The use scores varied similarly. The range was from 8 to 19, or from 2.67 to 6.33 when expressed in terms of ratings on Form 7A. This would indicate that the range was between very little use of special service resources to very extensive use of these resources. The semi-interquartile range was from approximately 11 to approximately 15, or, in terms of average ratings, from 3.67 to 5.0.

These variations prevailed despite the fact that all 41 programs had been certified by the Indiana State Board for Vocational Education to receive reimbursement from Federal and state vocational funds. Had these programs not been subjected to supervisory and administrative regulations as set forth and administered by this Board, the variations conceivably may have been greater. As it was, the results of analysis demonstrated that it was unlikely that students of vocational agriculture had equal opportunity to enroll in socially adapted programs of vocational agriculture, to the extent variations in resources was a deterrent to quality program operation.

2. The data tended to demonstrate a general inadequacy of resources. It admittedly is difficult to draw a fine line of demarcation between adequacy and inadequacy of resources. In that ratings of 1, 3, 5, and 7 on Form 7A were intended to represent ratings of not available, inadequate, adequate, and very adequate, respectively, for material resources, and ratings of not used, used little, used considerably, and

used extensively, respectively, for special service resources, it seemed reasonable to set an average rating of 5 or a resource or use score of 15 as a desired minimum for adequacy. The score, based on the summed average ratings for three categories of facilities or for three use items was considered justified in light of relatively uniform correlation of each resource or use item with the dependent variable, the operational aggregate.

The mean resource score was 12,219, with s = 2,575, and $s_{\bar{x}}$ = .402. The hypothesis that the mean of the population was 15 was rejected at the .1 per cent level of significance. Only four of the 41 programs actually received a resource score of 15 or higher. The mean use score was 13.39 with s = 3.016 and $s_{\bar{x}}$ = .471. The hypothesis that the true difference between the sample mean and the standard of 15 was zero was rejected at the 1 per cent level. However, twelve of the 41 schools received use scores of 15 or higher. Hence, in both instances the mean scores for the sample were significantly lower than the arbitrarly set standards.

The Future Direction

Whereas the data have indicated that both program emphasis and program operation were in the desired direction in terms of the concepts set forth in the contemporary design for vocational education, the data tend to indicate that resources for operating socially adapted programs have not kept pace with program demands. In that the combined effect of the resource and use scores has been shown to account for more than 57 per cent of the variance of the operational measure, it seems reasonable to conclude that any curriculum development program aimed at improving program operations logically requires a careful analysis of resource needs. In that both variations in adequacy of material resources and use of special service resources have been shown to be related to the apparent community desire to provide quality education as measured by financial effort to support education, it seems reasonable to deduce that increments in quality are in part dependent on community concepts held regarding the importance of education as reflected in the willingness to support financially an adequate program of education.

As an intermediate step in moving toward socially adapted programs, the formation of realistic minimum requirements for material resources is advocated. Thus, it is contended that appropriate classroom shop, and laboratory facilities and equipment and adequate, up-to-date teaching materials will contribute to higher levels of operation. Lack of adequate resources, it has been shown, tends to limit effectiveness of operation by restricting content and methodology. These suggestions for improvement, however, are contingent upon the employment of teachers who are qualified to utilize resources effectively.

That the teacher is an important element in the resource structure cannot be denied, but the burden of operating socially adapted programs cannot be assumed by the teacher when the school community fails to provide adequately for program operation. The handicaps of such demands appear to be almost insurmountable, as indicated by the fact that the mean operational aggregates of the low resource-high use schools did not differ significantly from the mean operational aggregate for the low resource-low use school, as was shown in Table VIII-4.[32]

IV. THE IMPLICATIONS OF DESIRED DIRECTION

From the previously reported summaries and syntheses, the following implications for desired direction may be drawn:

1. The trends which point to the vertical expansion of the occupational structure lead to needed emphasis on the purposes indicative of and closely related to technological and managerial changes in agriculture, to operations at higher levels, and to resources which enable operations to be conducted at higher levels.

2. The trends which point to the expansion and extension of educational opportunities lead to the need for expanded educational programs for persons who are preparing for, entering into, and adjusting to changing occupational conditions.

3. The findings of special significance for administrators at state and local levels are centered in the need for re-defining resource requirements and providing requirements in line with program demands.

4. The findings of special significance for pre- and in-service teacher education are centered in the need for appraising purposes, identifying and defining appropriate operational procedures, intensifying content, and integrating the instructional program with the trends, direction, and resources of agriculture not only locally but also in the broader community sense.

5. The findings of special significance to school-community development is the need for recognizing and acting upon the relationship, strongly suggestive of affective behavior related to attitudes and values, between the desire to provide quality programs as indicated by financial effort exerted to support education, and the quality of education, in the school community.

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[32] Supra, p. 209

CHAPTER X

THE ANALYSIS OF PURPOSES OF INDUSTRIAL EDUCATION

Chapter X reports the results of analyses of purposes of industrial education. This chapter is divided into two sections. Section I deals with the quantitative analysis of qualitative value judgments as expressed by the members of Jury II [1] with regard to the relative importance of the purposes. Section II pertains to an investigation of the extent of agreement between the jurors' ratings of purposes for importance and the ratings of the purposes for acceptance by the school raters.[2]

I. THE DERIVATION OF PURPOSE SCORES

Section I of this chapter deals with the assignation of a score to each of twenty-three purposes of industrial education. Quantifications and statistical analyses were applied to qualitative judgments in order (1) to obtain a quantitative hierarchy indicative of the order of importance of the purpose items, and (2) to obtain a set of scores for purposes amenable to statistical treatment.

The report on assigning scores to purpose items is divided into two parts, the first dealing with analyses of data made to ascertain the efficacy of the scoring procedure, and the second pertaining to tests of significance applied to determine extent of agreement among the three sub-juries.

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[1] See supra, p. 56

[2] Specific objectives listed in Chapter I (supra, p. 3) which are treated in the present chapter include:

(4.) To determine the relative importance of each of a list of twenty-three purposes of industrial education as appraised in light of a list of social, economic, and technical trends which have been ranked in order of the extent to which the trends should be considered in planning future programs of industrial education.

(5.) To ascertain the extent of agreement between scores assigned to purpose items by schools, based on acceptance of purposes as goals in industrial education programs, and scores assigned to purposes by jury members, based on judgments as to relative importance of purposes.

The Efficacy of the Scoring Procedure

The data used in deriving purpose scores were the ratings of the 84 educational specialists who comprised Jury II applied to Form 12 (Rating of Purposes: Industrial Education).[3]

The derivation and analysis of purpose scores. Quantitative scores were assigned to each of the twenty-three purposes of industrial education by summing the ratings assigned to each item for all raters. Item scores, together with the frequency distribution of jury members checking each numerical response category on Form 12, are shown in Table X-1. The purpose items listed in descending order of importance are listed in Table X-2.

The reliability of the scores assigned to items was determined by an internal consistency procedure of estimating test reliability for unrestricted item scoring methods by analysis of variance.[4] For the data in Table X-1, the sum of squares between items was calculated as 858.110, and, for 22 degrees of freedom, the mean square of items (MS_I) was 39.005. The residual or error sum of squares was 4848.238, and with (84-1) (23-1) or 1826 degrees of freedom, the mean square (MS_E) was 2.6551. The reliability coefficient was determined by the formula:

$$r_{tt} = (MS_I - MS_E) / MS_I,$$

which, in this instance, was (39.005 - 2.6551) / 39.005, or .932.

A reliability coefficient of .932 is indicative that the ratio of error variance to variance which accrued from systematic ratings was minimal. The efficacy of the rating-scoring procedure is demonstrated further by applying an F test to the null hypothesis to the effect that random ratings were assigned by raters to items. Using the formula $F = MS_I / MS_E$, and substituting 39.005 / 2.6551, the value of F was computed as 14.69. With 22 and 1826 degrees of freedom involved, the hypothesis was rejected, actually at the .1 per cent level of significance. The results of these tests indicated that there was practically no possibility that random ratings were assigned to purpose items, but, rather, that systematic judgment was exercised in selecting numerical response categories.

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[3] Infra, pp A-65 ff.

[4] C. J. Hoyt and C. L. Stunkard, "Estimation of Test Reliability for Unrestricted Item Scoring Methods," Educational and Psychological Measurement, 12: 756-8, Winter. 1952

TABLE X - 1

THE NUMBER OF JURY MEMBERS WHO CHECKED EACH NUMERICAL RESPONSE CATEGORY, AND THE TOTAL SCORE ASSIGNED TO EACH OF TWENTY-THREE PURPOSES OF INDUSTRIAL EDUCATION

Purpose number	Frequency of Jury Members Who Checked Each Response Category: Response categories 1	2	3	4	5	6	7	8	9	Purpose Scores	Purpose Ranks
1	1	3	2	3	10	14	25	7	19	561	13
2	1	0	2	5	13	6	23	15	19	580	10
3	0	8	3	10	14	9	22	12	6	493	22
4	1	1	8	11	15	8	17	16	7	504	20
5	0	1	4	2	15	9	26	19	8	557	15
6	1	1	0	1	1	3	11	22	44	679	1
7	5	8	9	9	13	6	18	4	12	451	23
8	0	2	0	2	8	6	14	21	31	633	3
9	0	0	2	1	6	4	28	15	28	632	4
10	1	0	3	1	9	7	16	15	32	621	6
11	0	1	2	0	4	7	30	16	24	24	5
12	0	1	0	1	2	3	17	24	36	669	2
13	0	2	2	3	8	12	32	16	9	567	12
14	0	2	2	3	10	12	19	16	20	585	9
15	6	5	8	4	12	10	11	11	17	494	21
16	1	1	5	9	12	11	25	9	11	526	19
17	0	2	4	5	12	11	24	12	14	552	16
18	4	2	4	5	11	10	18	12	18	539	18
19	3	0	3	0	12	5	20	17	24	594	8
20	0	1	1	5	6	8	21	15	27	613	7
21	0	3	1	4	12	11	21	18	14	568	11
22	1	4	7	4	10	6	15	10	27	560	14
23	1	6	3	4	15	5	18	11	21	546	17

TABLE X - 2

A LIST OF TWENTY-THREE PURPOSES OF INDUSTRIAL EDUCATION
RANKED IN ORDER OF DESCENDING PURPOSE SCORES

Rank	Purpose Number	Score	Item
1	6	679	To assist students in developing an appreciation for high standards of workmanship.
2	12	669	To assist students in developing traits such as initiative, cooperation, and resourcefulness, essential for successful occupational human relations.
3	8	633	To assist high school students in formulating realistic occupational goals.
4	9	632	To assist persons, established as industrial workers, in adjusting to changing needs, goals, and opportunities in industrial occupations.
5	11	624	To assist students in developing abilities essential to maintaining healthful and safe conditions on the job.
6	10	621	To assist currently employed workers in upgrading their level of occupational proficiency.
7	20	613	To assist students in developing abilities to form sound judgements and solve problems related to industrial processes.
8	19	594	To assist students in developing abilities essential for leadership and citizenship roles.

TABLE X - 2 (continued)

Rank	Purpose Number	Score	Item
9	14	585	To assist students in developing competencies in understanding and utilizing scientific concepts and methods involved in industrial processes.
10	2	580	To assist students in developing an understanding of related technical knowledge and information pertaining to industrial occupations.
11	21	568	To assist students in developing an appreciation and an understanding of labor-management relationships.
12	13	567	To assist students in exploring the possibilities of employment in industrial occupations.
13	1	561	To assist students in developing an appreciation for the social significance of the "world of work."
14	22	560	To assist students in developing specific operational skills essential for initial employment in a specific occupation.
15	5	557	To assist students in developing an appreciation for and an understanding of technological developments in industrial processes.

TABLE X - 2 (continued)

Rank	Purpose Number	Score	Item
16	17	552	To assist persons in developing a favorable attitude toward industrial occupations and industrial education in the community.
17	23	546	To assist high school students in obtaining employment in appropriate industrial occupations.
18	18	539	To assist students in developing basic operational skills that apply to a wide range of industrial occupations.
19	16	526	To assist students in developing an appreciation of the economic contributions of industrial workers to society.
20	4	504	To assist students in developing identification skills, such as identifying woods, metals, tools, and parts of equipment, involved in industrial processes.
21	15	494	To assist academically talented students in preparing for education beyond high school.
22	3	493	To assist students in developing the ability to select, care for, and use industrial products wisely.
23	7	451	To assist persons in developing interests and abilities of an avocational nature, such as may be utilized in hobbies and home repair, which are related to industrial occupations.

To determine the extent to which confidence may be placed on the rank order of purpose items, as shown in Table X-2, the least significant difference between any two item total (i.e., scores) was calculated. The estimate of the variance of any one total is N (MS_E), or 84 x 2.6551 or 223.0284, and the estimate of the variance of the difference between any two totals is (2) (N) (MS_E), or 446.0568. The standard error of the difference between any two totals, therefore, is 21.12. The least significant difference between any two totals, at the 5 per cent level of significance, is 1.96, the critical value of t, times 21.12, the standard error, or 41.39.

Inspection of the scores shown in Table X-2 reveals the points where purpose scores differed significantly. At the 5 per cent level of confidence, for example, Purpose No. 6 ranked first, did not score significantly higher than Purpose No. 12, ranked second. But Purpose No. 7 did score significantly higher than purposes ranked third or lower. The score of the lowest ranking purpose, Purpose No. 23, was significantly lower than any of the other purposes.

The results of the foregoing analyses confirmed the adequacy of the scaling procedures. Not only was the reliability of the scale found to be extremely high, but, of equal importance, evidence was obtained which indicated that the jury members attacked the problem of assigning scores to items systematically. Moreover, the scores assigned to individual purpose items varied to such extent that there was little or no likelihood that jury members regarded the purpose items as equal in importance.

Evidence of Agreement Among Sub-Juries

Analyses were made of scores and ranks of scores to ascertain variations between and among sub-juries. Correlation coefficients were computed of scores and ranks of scores between specialists in school administration and curriculum construction, between specialists in curriculum construction and industrial education, and between specialists in school administration and industrial education. Then a series of 23 null hypotheses was set up and tested to the effect that there were no variations among the three sub-juries as to mean scores assigned to individual items.

Table X-3 shows the scores assigned to purpose items summed separately for each of the three sub-juries and for the total sample. Ranks for each sub-jury and the total sample are also indicated. Rank order correlation coefficients of .73, .58, and .52 were obtained between ranks assigned by administration and curriculum sub-juries, between ranks assigned by curriculum and industrial education sub-juries, and between ranks assigned by administration and industrial education sub-juries, respectively. Product moment correlation

TABLE X - 3

SCORES AND RANKS ASSIGNED TO TWENTY-THREE PURPOSES OF INDUSTRIAL EDUCATION BY THREE SUB-JURIES OF EDUCATIONAL SPECIALISTS AND TOTAL JURY, SHOWING CORRELATIONS

Purpose			Sub-Juries of Educational Specialists					
			School administration		Curriculum construction		Industrial education	
Rank	Score	Number	Rank	Score	Rank	Score	Rank	Score
1	679	6	1	165	2	278	4	236
2	669	12	2	155	1	284	5	230
3	633	8	3	146	3	266	10	221
4	632	9	6	139	6	252	2	241
5	624	11	4	141	5	254	6	229
6	621	10	10.5	125	7	251	1	245
7	613	20	10.5	125	4	260	7	228
8	594	19	5	140	8.5	245	12	209
9	585	14	16.5	118	10	242	9	225
10	580	2	9	126	16	228	8	226
11	568	21	14	121	11	240	13	207
12	567	13	7	135	13	238	17	194
13	561	1	8	129	8.5	245	18	187
14	560	22	18	116	22	204	3	240
15	557	5	13	122	13	238	16	197
16	552	17	21	110	15	236	14	206
17	546	23	19	114	19	217	11	215
18	539	18	16.5	118	18	223	15	198
19	526	16	23	105	13	238	19	183
20	504	4	12	124	23	199	20	181
21	494	15	20	112	20	216	21	166
22	493	3	15	119	21	210	22	164
23	451	7	22	109	17	227	23	115

	Correlation coefficients	
	Rank order	Product moment
School administration - Curriculum construction	.73	.74
Curriculum construction-- Industrial education	.58	.51
School administration - Industrial education	.52	.48

coefficients of .74, .51, and .48 were obtained between scores assigned by administration and curriculum sub-juries, between scores assigned by curriculum and industrial education sub-juries, and between scores assigned by administration and industrial education sub-juries, respectively. The average product moment correlation was .59.

With twenty-three pairs of scores or ranks, a coefficient of .413 is required for significance at the 5 per cent level, and a coefficient of .526 is required for significance at the 1 per cent level. Thus, of the six hypotheses formulated to the effect that the true correlation was zero, all were rejected. Three hypotheses were rejected at the 5 per cent level of significance, and three hypotheses were rejected at the 1 per cent level.

Tests of significance were applied to ascertain whether the differences between and among the product moment correlation coefficients were statistically significant. The null hypothesis to the effect that there is no difference among the three coefficients -- .74, .51, and .48 -- was tested and was not rejected. Then the null hypothesis that the true difference between the correlation between the scores assigned by the administration and curriculum sub-juries (.74) and the correlation between the scores assigned by the administration and industrial education sub-juries (.48) was zero was tested and was not rejected. These statistical tests indicated that differences as great as those obtained might be expected to occur by chance when twenty-three pairs of scores or ranks are involved.

As to individual items, a series of twenty-three null hypotheses was formulated to the effect that the true difference between the mean rating assigned to each item by the three sub-juries was zero. The hypotheses were tested by an F statistic. The mean scores for each sub-jury and for the total jury are shown in Table X-4. Hypotheses were not rejected for thirteen of the twenty-three purpose items. Ten hypotheses were rejected, two at the 5 per cent level of significance, three at the 1 per cent level, and five at the .1 per cent level. Examination of the data reveals that in eight of the ten instances where the hypothesis was rejected, the industrial education sub-jury scored the purpose item higher than did the other two sub-juries.

The results of the correlations and the F tests indicated substantial agreement among the three sub-juries pertaining to the relative importance of the purpose items. In most instances, the items for which the means differed significantly were purposes related closely to the specialized trade and industrial education program. Here, as might be expected, the industrial education sub-jury, as a group, scored the purposes higher than did the other two sub-juries. But in view of the relatively high correlations, and the evidence of agreement for thirteen of the twenty-three purposes, it seemed reasonable to conclude that the three sub-juries were in basic agreement as to the relative importance of the purpose items.

TABLE X - 4

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE WHETHER THREE SUB-JURIES OF EDUCATIONAL SPECIALISTS VARIED IN SCORES ASSIGNED TO TWENTY-THREE PURPOSES OF INDUSTRIAL EDUCATION

Purpose		Sub-Juries of Educational Specialists				
Rank	Number	Administration A	Curriculum B	Ind. educ. C	Total jury T	P
1	6	8.25	7.94	8.13	8.08	NS
2	12	7.75	8.11	7.93	7.96	NS
3	8	7.30	7.60	7.62	7.54	NS
4	9	6.95	7.20	8.31	7.52	.001
5	11	7.05	7.26	7.90	7.43	NS
6	10	6.25	7.17	8.45	7.39	.001
7	20	6.25	7.43	7.86	7.30	.01
8	19	7.00	7.00	7.21	7.07	NS
9	14	5.90	6.91	7.76	6.96	.001
10	2	6.30	6.51	7.79	6.90	.01
11	21	6.05	6.86	7.14	6.76	NS
12	13	6.75	6.80	6.69	6.75	NS
13	1	6.45	7.00	6.45	6.68	NS
14	22	5.80	5.83	8.28	6.66	.001
15	5	6.10	6.80	6.79	6.63	NS
16	17	5.50	6.74	7.10	6.57	.01
17	23	5.70	6.20	7.41	6.55	.05
18	18	5.90	6.37	6.83	6.41	NS
19	16	5.25	6.80	6.31	6.26	.05
20	4	6.20	5.69	6.24	6.00	NS
21	15	5.60	6.17	5.72	5.88	NS
22	3	5.95	6.00	5.65	5.87	NS
23	7	5.45	6.49	3.97	5.37	.001

Summary

Section I of this chapter has been devoted (1) to an analysis of the derivation of purpose scores for the twenty-three purposes of industrial education, and (2) to examining the extent to which three sub-juries agreed on assigning scores to items. Evidence presented in this section was indicative (1) that, based on the relatively high reliability coefficient, ratings were assigned to purpose items with a high degree of consistency, and (2) the members of the three sub-juries, including specialists in school administration, curriculum construction, and industrial education, were in substantial agreement relative to the ratings assigned to the purpose items.

II. THE ANALYSIS OF SCORES ASSIGNED BY SCHOOL RATERS

The list of twenty-three purposes of industrial education was submitted to the principal of each cooperating high school, with instructions for the principal with the assistance of members of the staff responsible for teaching and administering the program to indicate the extent to which each purpose is accepted as a goal in the industrial education program of the school. The results of analyses of ratings, together with comparisons between ratings of importance as obtained from the jury and ratings of acceptance as obtained from the school raters, are presented in this section.

The Efficacy of the Scoring Procedure

The data used in deriving scores based on acceptance of purposes of industrial education were the ratings of 75 school raters applied to Form 8 (Industrial Education: Appraisal of Purposes).[5]

The derivation and analysis of scores based on purpose acceptance. School raters scored each item for extent of acceptance on a five point scale, ranging from 1 (no extent) to 5 (very great extent). Scores were assigned to purpose items by summing the quantitative values accorded to each item by the 75 raters. The number of school raters who checked each numerical category, and the total scores assigned to each of the twenty-three purposes of industrial education, are shown in Table X-5.

A reliability coefficient was computed for the data reported in Table X-5 by the procedures described previously. The sum of squares for items was determined to be 482.4962, and the mean square for items (MS_I) with 22 degrees of freedom, was 21.9316. The sum

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[5] Infra, pp. A-37 ff.

TABLE X - 5

THE NUMBER OF SCHOOL RATERS WHO CHECKED EACH NUMERICAL RESPONSE CATEGORY AND THE TOTAL SCORES ASSIGNED TO EACH OF TWENTY-THREE PURPOSES OF INDUSTRIAL EDUCATION, BASED ON ACCEPTANCE OF PURPOSES

Purpose number	Frequency of School Raters Who Checked Each Response Category: Response categories 1	2	3	4	5	Purpose Scores	Ranks
1	1	6	17	43	8	276	10.5
2	1	6	22	31	15	278	8.5
3	2	7	18	31	17	279	7
4	1	6	27	32	9	267	14
5	3	13	28	26	5	242	16
6	0	1	1	26	47	344	1
7	1	4	25	33	12	276	10.5
8	0	1	16	37	21	303	3
9	9	14	25	18	9	229	19
10	41	9	9	5	11	161	23
11	0	6	8	24	37	317	2
12	0	3	20	31	21	295	5
13	1	12	15	36	11	269	12.5
14	7	24	25	11	7	212	21
15	1	13	19	29	13	265	15
16	5	11	30	22	7	246	17
17	1	12	21	24	17	269	12.5
18	0	7	12	32	24	298	4
19	2	4	22	26	21	285	6
20	2	5	20	34	14	278	8.5
21	10	21	27	13	4	205	22
22	8	20	19	12	16	233	18
23	9	27	12	14	13	226	20

of squares for error was 1125.8516, and the mean square for error (MS_E), with 1628 degrees of freedom, was .6916. The coefficient of reliability was (MS_I - MS_E) / MS_I, or (21.9316 -.6916) / 21.9316, or .968.

The hypothesis that random ratings were assigned to items was tested by an F test. With F = MS_I / MS_E, or 21.93161 -.6916, or 31.71, and with 22 and 1628 degrees of freedom, the hypothesis was rejected at the .1 per cent level of significance. The results of these tests indicated that there was practically no possibility that random ratings were assigned to the purpose items by the school raters.

The least significant difference between any two totals shown in Table X-5 also was calculated. The estimate of variance of any one total is N(MS_E), or 75 x .6916, or 51.87, and the estimate of the variance of the difference between any two totals is (2) (N) (MS_E) or 103.74. The standard error of the difference between any two totals, therefore, is estimated as 10.1854. The least significant difference between any two totals, at the 5 per cent level of significance, is 1.96, the critical value of t, times 10.1854, the standard error, or 19.96.

Inspection of the scores assigned by raters shown both in Tables X-5 and X-6 reveals the points where scores differed significantly. The purpose item ranked highest by the schools scored significantly higher than items ranking second or lower, and the lowest ranking item scored significantly lower than all items ranking twenty-second or higher.

Evidence of Agreement Between School Raters and Jury

Agreement between school raters and total jury. Two hypotheses were set up and tested to the effect that there was no difference in the scores and rankings assigned by the school raters for purpose acceptance, and the scores and rankings assigned by the jury of 84 educational specialists for purpose importance. The hypotheses were tested by correlation analyses and by the chi-square test of independency in contingency tables.

Results of the correlation analyses are shown in Table X-6. The product moment correlation coefficient between the scores assigned by raters and the scores assigned by the jury was .17, and the rank order correlation coefficient was .26. The hypothesis that the true correlation was zero, failed to be rejected in both instances. With 23 pairs of scores or ranks a coefficient of .413 is required for significance at the 5 per cent level. Evidence was not forthcoming from the correlation coefficients to indicate that school raters were accepting as goals of the industrial education programs the purposes in the order in which they were scored and ranked for importance by the jury.

TABLE X-6

RANK ORDER AND PRODUCT MOMENT CORRELATIONS BETWEEN SCORES ASSIGNED TO INDUSTRIAL EDUCATION PURPOSE ITEMS BY SCHOOL RATERS FOR PURPOSE ACCEPTANCE AND SCORES ASSIGNED BY TOTAL JURY AND THREE SUB-JURIES FOR PURPOSE IMPORTANCE

Scores assigned by school raters			Scores assigned by total jury and sub-juries							
					Groups					
Purpose			Total jury		Adminis.		Curriculum		Ind. Educ.	
Rank	Score	No.	Rank	Score	Rank	Score	Rank	Score	Rank	Score
1	344	6	1	679	1	165	2	278	4	236
2	317	11	5	624	4	141	5	254	6	229
3	303	8	3	633	3	146	3	266	10	221
4	298	18	18	539	16.5	118	18	223	15	198
5	295	12	2	669	2	155	1	284	5	230
6	285	19	8	594	5	140	8.5	245	12	209
7	279	3	22	493	15	119	21	210	22	164
8.5	278	2	10	580	9	126	16	228	8	226
8.5	278	20	7	613	10.5	125	4	260	7	228
10.5	276	1	13	561	8	129	8.5	245	18	187
10.5	276	7	23	451	22	109	17	227	23	115
12.5	269	13	12	567	7	135	13	238	17	194
12.5	269	17	16	552	21	110	15	236	14	206
14	267	4	20	504	12	124	23	199	20	181
15	265	15	21	494	20	112	20	216	21	166
16	242	5	15	557	13	122	13	238	16	197
17	240	16	19	526	23	105	13	238	19	183
18	233	22	14	560	18	116	22	204	3	240
19	229	9	4	632	6	139	6	252	2	241
20	220	23	17	546	19	114	19	217	11	215
21	212	14	9	585	16.5	118	10	242	9	225
22	205	21	11	568	14	121	11	240	13	207
23	161	10	6	621	10.5	125	7	251	1	245

	Correlation coefficients	
	Rank order	Product moment
School raters - Total jury	.26	.17
School raters - Administration	.52	.52
School raters - Curriculum	.32	.29
School raters - Industrial education	-.02	-.14

To explore further the hypothesis of non-agreement, a chi-square test of independency in contingency tables was made to ascertain whether ratings assigned by school raters for the eight purposes ranked highest by the jury were independent of the ratings of the eight purposes ranked lowest. The results of this test are demonstrated in Table X-7. This hypothesis was rejected at the .1 per cent level of significance.

The apparent discrepancy between the two tests of agreement between school raters and jurors for purpose acceptance and importance may be explained, in part, by the number of observations involved in the tests and the direction of the results. The correlation coefficients were positive, but, with only 23 pairs of observations, were not sufficiently great to establish statistically significant agreement. However, the fudicial limits for a correlation coefficient of .17 with 23 pairs are - .260 to .545. The variation in proportions of school raters checking response categories for the highest ranking items, as compared with the lowest ranking items, was relatively small, but, with 1200 observations involved, the variation was large enough to result in the rejection of the hypothesis of equal proportions for the two groups of purposes. The data indicate, therefore, that the extent of agreement between purpose acceptance and purpose importance is positive, but not great.

A descriptive comparison of the intensity of rating as assigned by the jury and by school raters is presented in Table X-8. For the jury, the figures under the "very great" column denote the per cent of respondents who checked response categories "8" and "9". The per cent of jury members who checked response categories "6" and "7" is shown in the column headed "considerable", the per cent of jury members who checked response category "5" is shown in the column headed "moderate", and the per cent of jury members who checked response categories "1", "2", "3", or "4" is shown in the column headed "less than moderate." For the school raters, the per cent of raters who checked response category "5" is shown under the column headed "very great", the per cent of raters who checked response category "4" is shown under the column headed "considerable", the per cent of raters who checked response category "3" is shown under the column headed "moderate", and the per cent of raters who checked response categories "1" or "2" is shown in the column headed "less than moderate." Although caution was exercised in generalizing from the data in Table X-8, especially in light in the variations of the scales on which responses were checked, there was evidence to indicate that the jury members tended to rate the purpose items somewhat higher for importance than the school raters rated them for acceptance.

Agreement between school raters and sub-juries. Rank order and product moment correlation coefficients were computed between the ranks and scores assigned to purpose items by the school raters and

TABLE X - 7

RESULTS OF TESTS OF SIGNIFICANCE TO ASCERTAIN WHETHER RATINGS ASSIGNED BY SCHOOLS TO EIGHT INDUSTRIAL EDUCATION PURPOSE ITEMS RANKED HIGHEST BY JURY WERE INDEPENDENT OF RATINGS ASSIGNED BY SCHOOLS TO EIGHT PURPOSE ITEMS RANKED LOWEST BY JURY

Purpose Rank	Purpose Number	Frequency of School Raters Who Checked Response Categories: Response categories 1 - 2	3	4	5	Total ratings
1	6	1	1	26	47	75
2	12	3	20	31	21	75
3	8	1	16	37	21	75
4	9	23	25	18	9	75
5	11	6	8	24	37	75
6	10	50	9	5	11	75
7	20	7	20	34	14	75
8	19	6	22	26	21	75
Total of 8 high items		97	121	201	181	600
Per cent of total ratings in group		16.2	20.2	33.5	30.1	100.0
16	17	13	21	24	17	75
17	23	36	12	14	13	75
18	18	7	12	32	24	75
19	16	16	30	22	7	75
20	4	7	27	32	9	75
21	15	14	19	29	13	75
22	3	9	18	31	17	75
23	7	5	25	33	12	75
Total of 8 low items		107	164	217	112	600
Per cent of total ratings in group		17.8	27.3	36.2	18.7	100.0

Chi-square test of independency of frequency distribution - $P < .001$

TABLE X - 8

A COMPARISON BETWEEN THE PERCENTAGE OF JURY MEMBERS WHO CHECKED SELECTED RESPONSE CATEGORIES FOR IMPORTANCE OF PURPOSES AND PERCENTAGE OF SCHOOL RATERS WHO CHECKED COMPARABLE CATEGORIES FOR ACCEPTANCE OF PURPOSES FOR TWENTY-THREE PURPOSES OF INDUSTRIAL EDUCATION

Purpose Rank	Purpose No.	Group	N	Level of Importance (Jury) or Extent of Acceptance (School): Very Great %	Considerable %	Moderate %	Less than Moderate %
1	6	Jury	84	78.6	16.7	1.2	3.6
		School	75	62.7	34.7	1.3	1.3
2	12	Jury	84	71.4	23.8	2.4	2.4
		School	75	28.0	41.3	26.7	4.0
3	8	Jury	84	61.9	23.8	9.5	4.8
		School	75	28.0	49.3	21.3	1.3
4	9	Jury	84	51.2	38.1	7.1	3.6
		School	75	12.0	24.0	33.3	30.7
5	11	Jury	84	47.6	44.0	4.8	3.6
		School	75	49.3	32.0	10 7	8.0
6	10	Jury	84	56.0	27.4	10.7	6.0
		School	75	14.7	6.7	12.0	66.7
7	20	Jury	84	38.1	38.1	14.3	9.5
		School	75	18.7	45.3	26.7	9.3
8	19	Jury	84	48.8	29.8	14.3	7.1
		School	75	28.0	34.7	29.3	8.0
9	14	Jury	84	42.9	36.9	11.9	8.3
		School	75	9.3	14.7	34.7	41.3
10	2	Jury	84	40.5	34.5	15.5	9.5
		School	75	20.0	41.3	29.3	9.3
11	21	Jury	84	38.1	38.1	14.3	9.5
		School	75	5.3	17.3	36.0	41.3

TABLE X - 8 (continued)

Purpose Rank	Purpose No.	Group	N	Level of Importance (Jury) or Extent of Acceptance (School): Very Great %	Considerable %	Moderate %	Less than Moderate %
12	13	Jury	84	29.8	52.4	9.5	8.3
		School	75	14.7	48.0	20.0	17.3
13	1	Jury	84	31.0	46.4	11.9	10.7
		School	75	10.7	57.3	22.7	9.3
14	22	Jury	84	44.0	25.0	11.9	19.0
		School	75	21.3	16.0	25.3	37.3
15	5	Jury	84	32.1	41.7	17.9	8.3
		School	75	6.7	28.0	37.0	21.3
16	17	Jury	84	31.0	41.7	14.3	13.1
		School	75	22.7	32.0	28.0	17.3
17	23	Jury	84	38.1	27.4	17.9	16.7
		School	75	17.3	18.7	16.0	48.0
18	18	Jury	84	35.7	33.3	13.1	17.9
		School	75	32.0	42.7	16.0	9.3
19	16	Jury	84	23.8	42.9	14.3	19.0
		School	75	9.3	29.3	40.0	21.3
20	4	Jury	84	27.4	29.8	17.9	25.0
		School	75	12.0	42.7	36.0	9.3
21	15	Jury	84	33.3	25.0	14.3	27.4
		School	75	17.3	38.7	25.3	18.7
22	3	Jury	84	21.4	36.9	16.7	25.0
		School	75	22.7	41.3	24.0	12.0
23	7	Jury	84	19.0	28.6	15.5	36.9
		School	75	16.0	44.0	33.3	6.7

by each of the sub-juries. The results of these correlations are given in Table X-6. The rank order coefficients between ranks assigned by school raters and specialists in school administration, curriculum construction, and industrial education, respectively, were .51, .32, and -.02. The product moment correlations were .52, .29, and -.14, respectively. Six hypotheses to the effect that the true correlation was zero were tested. The hypotheses for the two administration correlations were rejected, but the other four hypotheses were not rejected.

Observation of the wide variations in the three coefficients prompted the formulation of a hypothesis to the effect that the three product moment correlations were drawn from a common population. The hypothesis was tested by the chi-square statistic. The obtained chi-square value of 5.229, with 2 degrees of freedom, was not sufficiently large to reject the hypothesis. Thus, it was concluded that with twenty-three pairs of ratings, coefficients of .52, .29, and -.14 could have come from a common population.

Further tests, however, were made to compare the individual pairs. The hypothesis that the true difference between the correlation between the scores assigned by school raters and by the administration specialists (.52) and the correlation between the scores assigned by school raters and by the curriculum specialists (.29) was zero was not rejected. Likewise, the hypothesis that the true difference between the correlation between the scores assigned by the school raters and by the curriculum specialists (.29) and the correlation between the scores assigned by the school raters and the industrial education specialists (-.14) was zero was not rejected. But the hypothesis that the true difference between the correlation between the scores assigned by the schools raters and by the administration specialists (.52) and the correlation between the scores assigned by the school raters and by the industrial education specialists (-.14) was zero was rejected at the 5 per cent level of significance.

Inasmuch as the sub-juries were found to be in substantial agreement with regard to scoring of purposes, whereas the correlation coefficients between the scores assigned by the school raters and the three sub-juries differed markedly, a further analysis of the data was made to study this discrepancy. To make the study, the purposes were divided into three groups. The eight purposes most closely related to trade and industrial education were placed in Group "A". The purposes placed in Group "A" were those numbered 2, 9, 10, 14, 20, 21, 22, and 23.[6]

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[6]The numbers listed in the narrative report and in Table X-9 correspond to the original numbers of the purposes. See infra, pp. A-37 ff.

Group B included seven purposes characteristic of specialized objectives of industrial arts programs. The purposes in Group B include those numbered 1, 3, 4, 7, 16, 17, and 18. Group C included the remaining eight purposes related to both industrial arts and trade and industrial education programs. The Group C purposes were those numbered 5, 6, 8, 11, 12, 13, 15, and 19.

The purposes in each of these three groups are listed in Table X-9. Table X-9 also shows the ranks assigned to each purpose by the total jury (Column A), by the school raters (Column B), by each of the three sub-juries (Columns C, D, and E). The ranks for each purpose group were summed and means were computed for each of the four sets of raters and for the total jury. Observation of the data discloses a wide variation in the average ranks for each group of purposes. This was especially true for Group A. Here the average rank assigned by the school raters was 17.5, by the administrative sub-jury 12.9, by the curriculum sub-jury 11.9, and by the industrial education sub-jury 6.8. Variations in mean ranks were nearly as great for Group B purposes. For this group, the mean rank assigned by the school raters was 10.6, by the administrative sub-jury 16.8, by the curriculum sub-jury 16.5, and by the industrial education sub-jury 18.7. On the other hand, there was only minor variation among the mean ranks assigned to Group C purposes by the four groups of raters.

The differences in correlation coefficients appeared to be lodged in whether the raters examined the purposes from a general (or industrial arts) orientation, as compared with a vocational (or trade and industrial education) orientation. The mean ranks shown in Table X-9 indicated that the industrial education sub-jury ranked the items from the orientation of a specialized vocational program, thus, accorded highest ranks to the purposes in Group A. In contrast, the school raters tended to rank the specialized purposes lowest; and; to rank the purposes common to both programs highest. The administration and curriculum sub-juries tended to rank the Group C purposes highest and the Group B purposes lowest. On a generalized continuum, then, the school raters and the industrial education groups tended to take the extreme positions, and the administration and curriculum groups indicated moderate positions.

Analysis of variance statistics were used to test a series of null hypotheses pertaining to the data in Table X-9. First, five H tests, using the Kruskal-Wallis one way analysis of variance by ranks,[7] were performed to test hypotheses that, for each group of raters, the sum of ranks assigned to each group of purposes (sample)

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[7] S. Siegel, Non-parametric Statistics for the Behavioral Sciences (New York: McGraw Hill Book Co; Inc., 1956) pp. 184-193.

TABLE X-9

A COMPARISON OF RANKS ASSIGNED BY THE TOTAL JURY, SCHOOL RATERS, AND THE THREE SUB-JURIES TO PURPOSES IN EACH OF THREE GROUPS, SHOWING RESULTS OF TESTS OF SIGNIFICANCE

Purpose number	F test	Ranks Assigned by Each Group: Total Jury	School Raters	Sub-juries: Admin.	Curr.	Ind. Ed.	F test
Column		A	B	C	D	E	
Group "A"							
2		10	8.5	9	16	8	
9		4	19	6	6	2	
10		6	23	10.5	7	1	
14		9	21	16.5	10	9	
20		7	8.5	10.5	4	7	
21		11	22	14	11	13	
22		14	18	18	22	3	
23		17	20	19	19	11	
$\bar{X}$	.01	9.8	17.5	12.9	11.9	6.8	.01
Group "B"							
1		13	10.5	8	8.5	18	
3		22	7	15	21	22	
4		20	14	12	23	20	
7		23	10.5	22	17	23	
16		19	17	23	13	19	
17		16	12.5	21	15	14	
18		18	4	16.5	18	15	
$\bar{X}$	.01	18.7	10.8	16.8	16.5	18.7	.05
Group "C"							
5		15	16	13	13	17	
6		1	1	1	2	4	
8		3	3	3	3	10	
11		5	2	4	5	6	
12		2	5	2	1	5	
13		12	12.5	7	13	17	
15		21	15	20	20	21	
19		8	6	5	8.5	12	
$\bar{X}$	NS	8.4	7.6	6.9	8.2	11.4	NS
H tests		.01	.02	.02	NS	.01	

could have come from the same population. Four of the five hypotheses were rejected, two at the 1 per cent level of significance, and two at the 2 per cent level. Only in the case of the hypothesis pertaining to the sum of ranks for the three groups of purposes for the curriculum sub-jury (Column D) was the hypothesis not rejected, and, in this instance, the H value was 5.62 where a value of 5.99 is required for significance for two degrees of freedom. Based on the results of these tests, it may be concluded that four of the five groups of raters were discriminatory in assigning ranks to purposes in the three groups.

A series of nine tests was made to test hypotheses that there were no differences in mean ranks assigned by specified groups or raters to specified groups of purposes. Here ranks were treated as scores in applying the single classification analysis of variance technique to the data. The results of the tests of hypotheses follow:

1. For Group "A" (trade and industrial education) purposes:

   a. The hypothesis that there was no difference in mean ranks assigned by the three sub-juries (Columns C, D, and E) was not rejected. (The result of this test is not shown in Table X-9.)

   b. The hypothesis that there is no difference in the mean ranks assigned by the total jury (Column A) and the school raters (Column B) was rejected at the 1 per cent level of significance.

   c. The hypothesis that there was no difference in mean ranks assigned by the school raters (Column B) and the three sub-juries (Columns C, D, and E) was rejected at the 1 per cent level.

2. For Group "B" (industrial arts) purposes:

   a. The hypothesis that there was no difference in mean ranks assigned by the three sub-juries (Columns C, D, and E) was not rejected. (The result of this test is not shown in Table X-9.)

   b. The hypothesis that there was no difference in mean ranks assigned by the total jury (Column A) and school raters (Column B) was rejected at the 1 per cent level.

   c. The hypothesis that there was no difference in mean ranks assigned by school raters (Column B) and the

three sub-juries (Columns C, D, and E) was rejected at the 5 per cent level.

3. For Group "C" (common) Purposes:

   a. The hypothesis that there was no difference in mean ranks assigned by the three sub-juries (Columns C, D, and E) was not rejected. (The result of this test is not shown in Table X-9.)

   b. The hypothesis that there was no difference in mean ranks assigned by the total jury (Column A) and school raters (Column B) was not rejected.

   c. The hypothesis that there was no difference in mean ranks assigned by the school raters (Column B) and the three sub-juries (Columns C, D, and E) was not rejected.

Summary

In summary, the results of analyses of correlation coefficients, as shown in Table X-6, and the results of analyses of ranks, as shown in Table X-9, indicated that there was slight agreement between scores and ranks assigned by school raters for purpose acceptance and scores and ranks assigned by the jury for purpose importance. The school raters tended to agree more closely with the administration and curriculum sub-juries than with the industrial education sub-jury. Yet, evidence pointed to substantial agreement among the three sub-juries as to the relative importance of the purpose items. When the purpose items were divided into three groups -- a trade and industrial education group, an industrial arts group, and a group de ed common to both programs -- and analyses were made of ranks assigned to purposes in each group by the school raters and the three sub-juries, marked differences in the ranking of the purposes were observed. The school raters, few of whom were operating programs of trade and industrial education, rated the trade and industrial education purposes relatively low and the industrial arts purposes relatively high. The industrial education sub-jury rated the trade and industrial education purposes relatively high and the industrial arts purposes relatively low. The school raters and the industrial education sub-jury, then, tended to take extreme positions on the rating of the trade and industrial education and the industrial arts purposes, whereas the administration and curriculum sub-juries indicated more moderate positions.

The effect of employing a jury composed of three groups of specialists may be observed from the data in Tables X-6 and X-9. The administration and curriculum sub-juries, as groups of raters, tended to prefer the common (broad, general) purposes, but did not

reject the specialized purposes related to trade and industrial education. The industrial education sub-jury, as a group, tended to prefer the specialized trade and industrial education purposes, but did not reject the common purpose in Group C. All three sub-juries ranked the Group B purposes - the ones most closely identified with industrial arts - uniformly low. Thus, it may be concluded that both specialized and broad, general purposes should be accepted as goals of programs of vocational education formulated in light of the contemporary design for vocational education.

SUMMARY OF CHAPTER X

The primary purpose of Chapter X was to obtain a score for each of twenty-three purposes of industrial education, based on the ratings assigned by Jury II, (1) to denote the relative importance of the purpose items in relation to the contemporary design for vocational education, and (2) to serve as a basis for further quantifications of data. Evidence was presented in Section I to show that Jury II, as a group of raters, attacked the problem of assigning ratings to purposes systematically, there being practically no possibility that random ratings were assigned to the items. Moreover, there was evidence of substantial agreement among the specialists in school administration, curriculum construction, and industrial education who comprised Jury II. The results of a test of reliability and of correlations between the sub-juries indicated that the scores assigned to the purpose items for importance were usable in further statistical analysis and treatment.

Section II of Chapter X presented an analysis of scores assigned to purposes by school raters. The scores were assigned in terms of the extent to which each purpose was accepted as a goal in the industrial education program of the school. Evidence was presented in Section II to show that the school raters attacked the problem of assigning scores to purposes systematically, the reliability coefficient being very high. The results of correlation coefficients and other statistical treatments demonstrated (1) that the school raters did not agree with the jury with regard to the order in which the purposes were scored and ranked although a slight position relationship was obtained, (2) that the ratings assigned by the school raters for acceptance correlated higher with the scores assigned by the administration sub-jury than with the scores assigned by the curriculum sub-jury or with the scores assigned by the industrial education sub-jury, (3) that the school raters were rating the purposes from a different frame of reference than the jury, with the school raters rating the purposes from a general, or industrial arts, form of reference, and the jury especially the industrial education sub-jury rating the purposes from a vocational frame of reference, and (4) that the jury, as a group of raters, tended to rate the purposes higher for importance than the school raters rated them for acceptance.

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CHAPTER XI

THE ASSIGNATION AND ANALYSIS OF OPERATIONAL SCORES FOR INDUSTRIAL EDUCATION

Chapter XI reports on how the data obtained on Forms 14[1] and 9[2] were used to derive an operational score for each of twenty-three purposes of industrial for each program and teacher of industrial education in the 75 school sample. The pattern of organization of Chapter XI is similar to that of Chapter V, pertaining to operational scores for the 41 school sample of programs of vocational agriculture. The present chapter is divided into four sections. Section I describes the procedures used to obtain an indication of the relative educational value of instructional activities associated with each of the three levels of operation identified for each purpose of industrial education. Section II reports on the derivation of an operational score for each purpose which was designed to quantify the operational emphasis and effort put forth to attain a specified purpose (1) by each program in the 75 school sample, and (2) by each teacher included in the sample. Section III pertains to the extent to which schools are emphasizing the purposes in the order in which the purposes were scored and ranked by Jury II. Section IV presents the results of a series of statistical analyses of the operational scores.[3]

I. THE QUANTIFICATION OF EDUCATIONAL VALUES OF LEVELS OF OPERATION

The results of the ratings of the fifty members of Jury IV, including 13 specialists in school administration, 18 specialists

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[1] Appraisal of Operational Levels: Industrial Education, infra, pp. A-81 ff.

[2] Industrial Education: Appraisal of Operational Levels, infra, pp. A-42 ff.

[3] The specific objectives treated in Chapter XI, as were listed in Chapter I, are:

(6.) To obtain a score indicative of the operational emphasis and effort being put forth to attain each of the twenty-three purposes of industrial education.

(7.) To ascertain which of a selected group of variables are related to variations in scores assigned to schools as a measure of the relative amount of operational emphasis and effort put forth to attain a specific purpose.

in curriculum construction, and 19 specialists in industrial education, are presented in Section I. The problem presented to the members of this jury was to appraise the relative educational value of three levels of operation for each of twenty-three purposes of industrial education. The procedures for preparing the ratings assigned by Jury IV to Form 14, Appraisal of Operational Levels: Industrial Education, for statistical analysis are identical to those described in Chapter V, as pertained to vocational agriculture, and, therefore, are not discussed in detail in this chapter.[4]

Summarization of the Scoring Procedures for Data Supplied by Jury IV

The mean quantitative values assigned by each of three sub-juries and the total jury for each level of operation for each of the twenty-three purposes of industrial education are shown in Table XI-1. Table XI-1 also lists each of the twenty-three purposes of industrial education, together with the descriptive statements of each of three levels of operation for each purpose. In addition, the results of sixty-nine statistical tests applied to test hypotheses that the quantitative values assigned to each level of operation for each of the twenty-three purposes of industrial education were independent of the sub-jury to which the respondent belonged are presented in Table XI-1. Additional information presented in Table XI-1, pertaining to score values available to schools for eacn rating category, will be discussed in a later sub-section of Chapter XI.

The results of sixty-nine tests of hypotheses are shown in Table XI-1 by appropriate letter superscripts. An "a" indicates that the hypothesis was rejected at the .1 per cent level of significance, a "b" indicates that the hypothesis was rejected at the 1 per cent level, and a "c" indicates that the hypothesis was rejected at the 5 per cent level. Of the sixty-nine hypotheses tested, thirty-three were rejected, eighteen at the 5 per cent level of significance, fourteen at the 1 per cent level, and one at the .1 per cent level. Thus, in marked contrast to the relative homogeneity of ratings given by the three sub-juries in Jury III, the sub-juries in Jury IV disagreed significantly on nearly one-half of the ratings. Detailed examination of the individual purpose items reveals no specific pattern with regard to the purposes on which the sub-juries, as groups of raters, tended to disagree. It may be noted that there were fewer disagreements in the purposes which, as was reported in Table X-9,[5] were classified as trade and industrial education purposes; and that the greatest number of significant differences were obtained for

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[4] Supra, pp. 79-96.

[5] Supra, pp. 257

TABLE XI - 1

TABLE GIVING DESCRIPTIVE STATEMENTS OF LEVELS OF OPERATION, MEAN QUANTITATIVE VALUES ASSIGNED BY JURIES TO EACH LEVEL FOR EACH PURPOSE OF INDUSTRIAL AGRICULTURE AND SCORES AVAILABLE TO SCHOOLS FOR EACH CATEGORY

Purpose / Levels of operation	Mean quantitative value assigned by juries (Groups)				Score values available to schools for each rating category (Ratings)				
	Adm.	Cur.	Ind.Ed.	Total	0	1	2	3	4
1. To assist students in developing an appreciation for the social significance of the "world of work."									
A. Direct study and discussion of the social contributions of the industrial worker to society -	3.98	2.88	4.29	3.70[c]	0	9.2	18.5	27.8	37.0
B. Direct study and analysis of the possibilities for horizontal and vertical advancement in industrial occupations - - - - - - - - - - - - - - - -	2.18	2.86	2.61	2.58	0	6.5	13.0	19.5	26.0
C. Direct study and analysis of the interrelationship between industry and society as a whole - -	3.92	4.28	3.12	3.74[c]	0	9.2	18.5	27.8	37.0
2. To assist students in developing an understanding of related technical knowledge and information pertaining to industrial occupations.									
A. Direct study and discussion of related technical knowledge- - - - - - - - - - - - - - - - - - - -	4.07	3.31	4.44	3.94	0	9.8	19.5	29.2	39.0
B. Plan, develop, and carry out projects to provide experience in relating technical knowledge to industrial processes and operations- - - - - - -	4.23	3.99	3.88	4.01	0	10.0	20.0	30.0	40.0
C. Create and design experiments to add to the fund of technical knowledge - - - - - - - - - - - - - -	1.70	2.70	1.67	2.05	0	5.2	10.5	15.8	21.0

TABLE XI-1 (continued)

Purposes — Levels of operation	Mean quantitative value assigned by juries (Groups)				Score values available to schools for each rating category (Ratings)				
	Adm.	Cur.	Ind.Ed.	Total	0	1	2	3	4
3. To assist students in developing the ability to select, care for, and use industrial products wisely.									
A. Study and discuss consumer information in general	4.15	2.68	4.44	3.73[c]	0	9.2	18.5	27.8	37.0
B. Develop criteria on which to base selection of industrial products	2.23	3.04	2.56	2.65	0	6.8	13.5	20.2	27.0
C. Examine products and compare with established criteria	3.62	4.28	3.00	3.62	0	9.0	18.0	27.0	36.0
4. To assist students in developing identification skills, such as identifying woods, metals, tools, and parts of equipment, involved in industrial processes.									
A. Direct study and discussion of industrial skills	4.09	2.17	3.89	3.32[b]	0	8.2	16.5	24.8	33.0
B. Direct the performance of skills in the shop	3.05	4.28	2.97	3.46[b]	0	8.8	17.5	26.2	35.0
C. Direct the application of skills under actual or simulated job conditions	2.87	3.56	3.14	3.22	0	8.0	16.0	24.0	32.0

TABLE XI-1 (continued)

Purposes / Levels of operation	Mean quantitative value assigned by juries (Groups)				Score values available to schools for each rating category (Ratings)				
	Adm.	Cur.	Ind.Ed.	Total	0	1	2	3	4
5. To assist students in developing an appreciation for and an understanding of technological developments in industrial processes.									
A. Direct study and discussion of technological developments in industrial occupations - - - - - -	4.55	3.05	4.96	4.16[c]	0	10.5	21.0	31.5	42.0
B. Survey the community to ascertain the extent to which technological developments have been put to use -	2.85	3.54	2.91	3.12	0	7.8	15.5	23.2	31.0
C. Design applications of technological developments to industrial processes- - - - - - - - - -	2.59	3.41	2.13	2.71	0	6.8	13.5	20.2	27.0
6. To assist students in developing an appreciation for high standards of workmanship.									
A. Direct study and discussion of good work habits emphasizing planning of work and quality of performance -	4.67	2.87	3.46	3.56[c]	0	9.0	18.0	27.0	36.0
B. Plan, develop, and carry out projects to develop high standards of workmanship- - - - - - - - - -	3.19	4.08	3.95	3.80	0	9.5	19.0	28.5	38.0
C. Measure performance against criteria of satisfactory workmanship typically used in industrial occupations- - - - - - - - - - - - - - - - - - - -	2.15	3.04	2.58	2.64	0	6.5	13.0	19.5	26.0

TABLE XI-1 (continued)

Purposes / Levels of operation	Mean quantitative value assigned by juries (Groups)				Score values available to schools for each rating category (Ratings)				
	Adm.	Cur.	Ind.Ed.	Total	0	1	2	3	4
7. To assist persons in developing interests and abilities of an avocational nature, such as may be utilized in hobbies and home repair, which are related to industrial occupations.									
A. Study and discuss the avocational aspects of industrial occupations	3.93	2.36	3.19	3.08	0	7.8	15.5	23.2	31.0
B. Conduct informal instruction programs such as clubs and activities related to the avocational aspects of industrial occupations	2.42	3.77	3.39	3.28	0	8.2	16.5	24.8	33.0
C. Organize formal instruction programs, such as adult classes in woodworking, related to the avocational aspects of industrial education	3.65	3.87	3.42	3.64	0	9.0	18.0	27.0	36.0
8. To assist high school students in formulating realistic occupational goals.									
A. Encourage students who express verbal interest in industrial occupations to prepare for them	4.17	2.07	3.00	2.97[c]	0	7.5	15.0	22.5	30.0
B. Determine levels of aptitude and interest in industrial occupations	2.68	3.32	3.12	3.23	0	8.0	16.0	24.0	32.0
C. Provide try-out and directed work experiences in industrial occupations	2.78	4.44	3.75	3.81[c]	0	9.5	19.0	28.5	38.0

TABLE XI-1 (continued)

Purposes / Levels of operation	Mean quantitative value assigned by juries (Groups)				Score values available to schools for each rating category (Ratings)				
	Adm.	Cur.	Ind.Ed.	Total	0	1	2	3	4
9. To assist persons established as industrial workers in adjusting to changing needs, goals, and opportunities in industrial occupations.									
A. Organize and conduct programs of instruction to prepare adults for new or different occupations -	6.10	4.47	6.08	5.51	0	13.8	27.5	41.2	55.0
B. Hold regular conferences with employed workers to assist them in analyzing aptitudes and interests and in planning individual retraining programs- -	1.70	2.88	1.82	2.17	0	5.5	11.0	16.5	22.0
C. Organize and conduct intensive or extensive courses at post high school levels- - - - - - - -	2.20	2.65	2.11	2.33	0	5.8	11.5	17.2	23.0
10. To assist currently employed workers in upgrading their level of occupational proficiency.									
A. Organize and conduct programs of instruction to help industrial workers upgrade their occupational level- -	6.40	4.98	6.42	5.90	0	14.8	29.5	44.2	59.0
B. Hold regular conferences with employed workers to assist in analyzing aptitudes and interests and in planning individual upgrading programs - - - -	1.54	2.47	1.36	1.81	0	4.5	9.0	13.5	18.0
C. Organize and conduct intensive or extensive technical courses at post high school levels- - - - -	2.06	2.56	2.22	2.30	0	5.8	11.5	17.2	23.0

TABLE XI-I (continued)

Purposes / Levels of operation	Mean quantitative value assigned by juries (Groups)				Score values available to schools for each rating category (Ratings)				
	Adm.	Cur.	Ind.Ed.	Total	0	1	2	3	4
11. To assist students in developing abilities essential to maintaining healthful and safe conditions on the job.									
A. Direct study and discussion of health and safety practices- -	5.76	2.99	3.83	4.03[b]	0	10.0	20.0	30.0	40.0
B. Organize learning experiences, integrated with appropriate classes, to improve health and safety practices in the classroom and shop- - - - - - -	2.15	3.39	3.53	3.12	0	7.8	15.5	23.2	31.0
C. Plan, develop, and carry out long-range programs to improve health and safety practices on the job and in the community - - - - - - - - - - - - - - - -	2.09	3.62	2.64	2.85[c]	0	7.2	14.5	21.8	29.0
12. To assist students in developing traits such as initiative, cooperation, and resourcefulness, essential for successful occupational adjustments and human relations.									
A. Direct study and discussion of personal traits essential for successful adjustment in industrial occupations- - - - - - - - - - - - - - - - - - - -	4.82	2.66	3.94	3.71[b]	0	9.2	18.5	27.8	37.0
B. Provide individual counseling services to assist students in self-analysis and self-improvement -	3.29	3.78	3.32	3.48	0	8.8	17.5	26.2	35.0
C. Plan, develop, and carry out group activities to develop traits essential for occupational success	1.89	3.56	3.26	2.81[c]	0	7.0	14.0	21.0	28.0

TABLE XI-1 (continued)

Purposes / Levels of operation	Mean quantitative value assigned by juries (Groups)				Score values available to schools for each rating category (Ratings)				
	Adm.	Cur.	Ind.Ed.	Total	0	1	2	3	4
13. To assist students in exploring the possibilities of employment in industrial occupations.									
A. Direct study and discussion of the general nature of industrial occupations- - - - - - - - - - - - -	4.52	2.63	3.41	3.42[c]	0	8.5	17.0	25.5	34.0
B. Survey the community to determine the types of, and employment in, industrial occupations- - - -	3.30	3.77	3.08	3.38	0	8.5	17.0	25.5	34.0
C. Analyze the nature, training requirements, and current and future demands for industrial workers at local, state, national, and global levels	2.18	3.60	3.52	3.20[c]	0	8.0	16.0	24.0	32.0
14. To assist students in developing competencies in understanding and utilizing scientific concepts and methods involved in industrial processes.									
A. Direct study and discussion of the nature of scientific thought and practice- - - - - - - - -	5.31	2.42	3.77	3.68[a]	0	9.2	18.5	27.8	37.0
B. Plan, develop, and carry out projects to provide experiences in applying the products of scientific thought and practice- - - - - - - - - - - - -	2.92	4.13	4.44	4.02	0	10.0	20.0	30.0	40.0
C. Create and design experiments to add to the fund of scientific knowledge- - - - - - - - - - - - -	1.77	3.22	1.79	2.30[b]	0	5.8	11.5	17.2	23.0

TABLE XI-1 (continued)

Purposes / Levels of operation	Mean quantitative value assigned by juries (Groups)				Score values available to schools for each rating category (Ratings)				
	Adm.	Cur.	Ind.Ed.	Total	0	1	2	3	4
15. To assist academically talented students in preparing for education beyond high school.									
A. Direct study and discussion of opportunities in industrial occupations requiring education beyond high school- - - - - - - - - - - - - - - - - - - -	5.62	2.81	4.01	4.00[b]	0	10.0	20.0	30.0	40.0
B. Provide enriched experiences, within regular course offerings, to challenge academically competent students- - - - - - - - - - - - - - - - - -	2.26	3.46	2.87	2.92	0	7.3	14.5	21.8	29.0
C. Provide advanced courses in industrial education permitting academically talented students to exercise their creative imagination- - - - - - - -	2.12	3.73	3.12	3.08[c]	0	7.8	15.5	23.2	31.0
16. To assist students in developing an appreciation of the economic contributions of industrial workers to society.									
A. Direct study and discussion of the economic importance of industrial occupations - - - - - - - - - -	5.52	2.97	4.11	4.05[b]	0	10.2	20.5	30.8	41.0
B. Plan, develop, and carry out projects to determine the economic importance of industrial occupations in the community - - - - - - - - - - - - - - - - -	2.09	3.98	3.48	3.30[b]	0	8.2	16.5	24.8	33.0
C. Direct the examination and analysis of data from local, state, and national sources to determine present and future importance of the economic contributions of industrial occupations- - - - -	2.44	3.05	2.53	2.64	0	6.5	13.0	19.5	26.0

TABLE XI-1 (continued)

Purposes / Levels of operation	Mean quantitative value assigned by juries (Groups)				Score values available to schools for each rating category (Ratings)				
	Adm.	Cur.	Ind.Ed.	Total	0	1	2	3	4
17. To assist persons in creating a favorable attitude toward industrial occupations and education in the community.									
A. Give talks, exhibit displays, or otherwise informally interpret industrial occupations and education to the school and community	6.90	4.13	5.64	5.42[b]	0	13.5	27.0	40.5	54.0
B. Organize an informal education program, using a variety of communication media, to interpret industrial occupations and education in the community	1.79	3.70	2.20	2.63[b]	0	6.5	13.0	19.5	26.0
C. Organize formal programs of instruction, for all age levels, designed to interpret industrial occupations and education to the community	1.32	2.17	2.17	1.95	0	5.0	10.0	15.0	20.0
18. To assist students in developing basic operational skills that apply to a wide range of industrial occupations.									
A. Direct the performance of hand operations essential for employment in a variety of occupations	5.71	3.32	5.18	4.65[b]	0	11.5	23.0	34.5	46.0
B. Direct the performance of mechanical operations essential for employment in a variety of occupations	1.35	2.66	2.28	2.18[c]	0	5.5	11.0	16.5	22.0
C. Direct an analysis of basic operational skills, and assist in developing understandings of their applications to a variety of occupations by providing actual or simulated job conditions	2.94	4.03	2.53	3.18[c]	0	8.0	16.0	24.0	32.0

TABLE XI -1 (continued)

Purposes / Levels of operation	Mean quantitative value assigned by juries (Groups)				Score values available to schools for each rating category (Ratings)				
	Adm.	Cur.	Ind.Ed.	Total	0	1	2	3	4
19. To assist students in developing abilities essential for leadership and citizenship roles.									
A. Direct study and discussion of the knowledge and skills required for successful acceptance of leadership and citizenship roles - - - - - - - - - -	5.20	2.78	3.67	3.75[b]	0	9.2	18.5	27.8	37.0
B. Plan, develop, and carry out activities to provide experiences in leadership and citizenship responsibilities in the classroom and shop- - - - - - -	1.99	4.06	3.69	3.38[b]	0	8.5	17.0	25.5	34.0
C. Plan, develop, and carry out projects to provide direct experiences in leadership and citizenship responsibilities in the school and community - -	2.81	3.17	2.64	2.87	0	7.2	14.5	21.8	29.0
20. To assist students in developing abilities to form sound judgments and solve problems related to industrial processes.									
A. Direct study and discussion of typical problems pertaining to simple industrial processes- - - -	4.31	2.51	3.46	3.34[c]	0	8.2	16.5	24.8	33.0
B. Plan, develop, and carry out projects, with specific instructions, to provide experiences in working out problems involved in typical industrial processes- - - - - - - - - - - - - - - - - -	3.01	3.74	3.91	3.61	0	9.0	18.0	27.0	36.0
C. Plan, develop, and carry out projects in actual or simulated job conditions to provide experiences in creating solutions to problems related to industrial processes- - - - - - - - - - - - -	2.69	3.74	2.64	3.05[c]	0	7.8	15.5	23.2	31.0

TABLE XI-1 (continued)

Purposes / Levels of operation	Mean quantitative value assigned by juries				Score values available to schools for each rating category				
	Groups				Ratings				
	Adm.	Cur.	Ind.Ed.	Total	0	1	2	3	4
21. To assist students in developing an appreciation and an understanding of labor-management relationships.									
A. Direct study and discussion of labor-management relations- -	4.95	2.69	4.37	3.91[b]	0	9.8	19.5	29.2	39.0
B. Plan, develop, and carry out surveys of the community to determine labor-management problems- -	2.24	3.47	2.78	2.89	0	7.2	14.5	21.8	29.0
C. Structure simulated problems in labor-management relationships to provide experiences in arriving at possible solutions- - - - - - - - - - - - - - -	2.82	3.84	2.85	3.20	0	8.0	16.0	24.0	32.0
22. To assist students in developing specific operational skills essential for initial employment in a specific occupation.									
A. Direct the performance of the hand operations essential for employment in specific occupations -	5.06	2.96	4.82	4.21[c]	0	10.5	21.0	31.5	42.0
B. Direct the performance of the mechanical operations essential for employment in specific occupations- -	2.22	3.02	2.44	2.59	0	6.5	13.0	19.5	26.0
C. Direct an analysis of the basic operational skills and develop an understanding of their application to industrial occupations by providing actual or simulated job conditions - - - - - - - - - - - -	2.72	4.02	2.74	3.20[c]	0	8.0	16.0	24.0	32.0

TABLE XI-1 (continued)

Purposes	Levels of operation	Mean quantitative value assigned by juries				Score values available to schools for each rating category				
		Groups				Ratings				
		Adm.	Cur.	Ind.Ed.	Total	0	1	2	3	4
23. To assist high school students in obtaining employment in appropriate industrial occupations.										
	A. Direct study and discussion of the placement opportunities in the community - - - - - - - - - -	5.18	2.87	3.98	3.89[b]	0	9.8	19.5	29.2	39.0
	B. Plan, develop, and carry out surveys of the community to locate placement opportunities - - - -	1.92	3.04	2.72	2.63	0	6.5	13.0	19.5	26.0
	C. Assist students in obtaining employment in jobs which utilize particular competencies possessed by the students- - - - - - - - - - - - - - - - - -	2.90	4.08	3.30	3.48	0	8.8	17.5	26.2	35.0

[a] Hypothesis is that the true difference among means is zero rejected at .1 per cent level of significance.

[b] Hypothesis is that the true difference among means is zero rejected at 1 per cent level of significance.

[c] Hypothesis is that the true difference among means is zero rejected at 5 per cent level of significance.

levels of operation for purposes which were considered to be common to both industrial arts and trade and industrial education programs. This trend, however, was not statistically significant.

The disagreement of the sub-juries is summarized in Table XI-2. Table XI-2 shows the mean total rating assigned by each juror for each level of operation for each of the three sub-juries, and, also, the mean rating assigned to each level. Observation of the data indicates that the greatest disagreement was between the school administration and curriculum sub-juries. The school administration sub-jury rated Level A operations higher than did the curriculum sub-jury, whereas the curriculum sub-jury rated Levels B and C operations higher than did the administration sub-jury. The mean ratings of the industrial education sub-jury ranged between the school administration and the curriculum sub-juries. For Level A operations, the mean ratings of the school administration, curriculum, and industrial education sub-juries were 5.00, 2.98, and 4.27, respectively, with an overall mean rating for the total jury of 4.00. For Level B ratings, the means for the items were 2.48 for the school administration sub-jury, 3.51 for the curriculum sub-jury, and 3.02 for the industrial education sub-jury, with an overall mean of 3.05 for the total jury. For Level C operations, the means were 2.52, 3.51, and 2.71, for the school administration, curriculum, and industrial education sub-juries, respectively, with a mean of 2.95 for the total jury.

TABLE XI-2

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE WHETHER THREE SUB-JURIES DIFFERED SIGNIFICANTLY IN RATINGS ASSIGNED TO THREE LEVELS OF OPERATION FOR TWENTY-THREE PURPOSES OF INDUSTRIAL EDUCATION

		Mean Ratings for Three Levels					
		Level "A"		Level "B"		Level "C"	
Sub-juries	N	Raters	Items	Raters	Items	Raters	Items
School administrators	13	114.91	5.00	56.98	2.48	58.18	2.52
Curriculum specialists	18	68.61	2.98	80.71	3.51	80.75	3.51
Industrial educators	19	98.19	4.27	69.38	3.02	62.27	2.71
		P < .01		P < .01		P < .05	
Total jury	50	91.89	4.00	70.24	3.05	67.86	2.95

Hypotheses to the effect that the average rating for the twenty-three purposes assigned by each sub-jury was independent of the group to which the individual belonged were rejected for all three levels, with the hypothesis pertaining to Levels A and B rejected at the 1 per cent level of significance, and the hypothesis for Level C rejected at the 5 per cent level. Thus, the data show that the school administration and industrial education sub-juries, as groups of raters, tended to favor the study-discussion type of activities which generally characterized the Level A activities, whereas the curriculum sub-jury tended to favor Levels B and C activities, which are characterized by greater emphasis on student activities and direct participation in learning experiences.

Despite the disagreement of the three sub-juries with regard to the educational importance of activities characterized by Levels A, B, and C, the mean ratings as shown in Table XI-1, and as summarized in Table XI-2, indicate that none of the three groups would be satisfied completely with operations limited to Level A. If the maximum operational score available to a school for attaining a purpose were set, arbitrarily, at 100, a school operating at maximum effectiveness at Level A would receive an operational score of 50, according to the scoring of the administration sub-jury 30 according to the scoring of the curriculum sub-jury, and 43 according to the scoring of the industrial education sub-jury. The composite rating of the total jury indicates that a maximum score of 40 out of a possible score of 100 would be assigned to a school operating at maximum effectiveness at Level A. No attempt was made to determine absolute minimums which should be considered for the operation of educational programs; however, it seems reasonable to believe that in order to attain a reasonable proficient score on the basis of these scalings, some activity at Levels B and/or C is to be desired.

In summary, then, it may be pointed out that the sub-juries tended to disagree with regard to the educational value of the teaching-learning activities characterized by each of three levels of operation, and that the differences were statistically significant. It may also be pointed out, however, that to attain what might be considered a reasonably proficient score, some activity beyond Level A was considered desirable.

II. DERIVING OPERATIONAL SCORES FOR SCHOOLS

The procedures used in deriving operational scores for each school were essentially the same as those described for the vocational agriculture program in Section II of Chapter V of this

report.[6] The major difference was that in collecting data from the schools during the observational interviews, Form 9, Appraisal of Operations: Industrial Education[7] was used as a guide to the questioning and observing process.

Deriving Operational Scores for Schools

Determining the quantitative value of a rating. In deriving operational scores for the industrial education programs in the schools in the study, it was determined, arbitrarily, that the maximum score available when ratings of 4 were given for all three levels on Form 9 was to be 100. The maximum score available for each level was determined by the scores of Jury IV as shown in Table XI-1. This decision was made despite the variations in the ratings assigned by the sub-juries to each level of operation. The averaging of the scores assigned by the fifty member jury was, in effect, the application of an assumption that the mean rating of the total jury represented a more realistic judgment of the relative value of each of the three levels of operation than the mean ratings of any sub-jury. This assumption is especially pertinent in view of the fact that the ratings were based, at least in part, on the results of Part I of the study.[8] Since the jury ratings were computed on the basis of a maximum score of ten points, the mean ratings of the jury were transposed to maximum scores available to each level by multiplying the jury score for a specific level by ten and rounding to the nearest whole number. For example, the mean quantitative value assigned by the jury for Level A of Purpose No. 1, as shown in Table XI-1, was 3.70, the value for Level B was 2.58, and the value for Level C was 3.74. The maximum scores available to the schools for this purpose for the three levels were 37.0, 26.0, and 37.0, respectively.

To determine values to be used in computing operational scores when ratings of less than 4 were assigned for operational effort and emphasis at a specified level, the maximum scores available for each level was partialled into four parts in accordance with an assumption of equal distance between the rating categories. Thus, for Level A of Purpose No. 1, where the maximum operational score available was 37.0, the value assigned for a rating of zero on Form 9 was zero, for a rating of 1 was 9.2, for a rating of 2 was 18.5, and for a rating of 3 was 27.8. The score

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[6] Supra, pp. 97-100.

[7] Infra, pp. A-42 ff.

[8] Supra, pp. 53-54

available to schools for each rating category for each purpose based on the rating assigned to the school on Form 9. Hence, if a school received a rating of 3 on Level A of Purpose No. 1, a rating of 22 for Level B, and a rating of 1 for Level C, the operational score was 27.8 plus 13.0 plus 9.2, or 50.0.

Determining operational scores in schools where more than one teacher was interviewed. In contrast with the practice followed in vocational agriculture, as outlined in Chapter V, in which instance only one teacher was employed and interviewed in each school, it was necessary to interview two or more teachers in a majority of the schools offering industrial education programs. To the extent that it was possible, each teacher was interviewed individually, and the ratings were recorded on Form 9. In a few instances, in some of the larger schools, it was not possible to interview each teacher, either because the teacher was not available during the date set for the interview or because lack of time or scheduling difficulties precluded the interviewing of each teacher. In such instances, the teachers who were interviewed and included in the sample were selected randomly.

In schools where two or more teachers were interviewed, an operational score was computed for each teacher in the school. In addition, where specialized supervisory or administrative personnel were employed by the school, these persons were interviewed, and a rating was assigned to this person for the specific purposes for which the individual had special responsibility. For example, in some instances, the placement of graduates was the responsibility of a vocational coordinator. In these instances, special attention was given to querying the coordinator with regard to Purpose No. 23, "to assist high school students in obtaining employment in appropriate industrial occupations." The operational score for the school for each purpose was obtained by averaging the operational scores for the teachers in the school interviewed. The scores assigned to specialized personnel for specific purposes were also averaged into the school operational score for the purposes in which the special instances prevailed. Thus, an operational score was computed for each purpose for each of 196 teachers interviewed and rated as part of the study, and, also, for each of the 75 programs in the sample.

Description of Operational Scores

The present sub-section presents information on (1) the means and ranges of operational scores obtained for the 75 school sample of programs offering industrial education, and (2) a description of the extent to which schools were operating programs of industrial education at each of the three levels of operation.

Means and ranges of scores. The means and standard deviations for each of the twenty-three purposes of industrial education are shown in Table XI-3. According to the data in Table XI-3, mean scores ranged from a low of 3.70 for Purpose No. 9 to a high of 67.41 for Purpose No. 6. The average mean score for the twenty-three purposes was 34.71. The data indicate that the schools in the sample were not placing uniform emphasis upon the twenty-three purposes of industrial education, as indicated by the wide variations in the mean operational scores. Further, the data indicate that the schools varied in terms of the relative amount of emphasis placed upon each purpose, as denoted by the measures of dispersion presented in Table XI-3. The measures of dispersion included the range, the semi-interquartile range, and the intervals between -1 and +1 standard deviations. Parenthetically, it may be noted that the data in Table XI-3 indicate that for each of the purposes of industrial education, the dispersion of scores approximated a normal distribution. This observation is made by comparing the median score with the mean score, by comparing the score for -1 standard deviation with the score for the 25th percentile, and by comparing the score for +1 standard deviation with the score for the 75th percentile. Insofar as the scores obtained for each purpose are indicative of the operational effort and emphasis being put forth by the programs in the 75 school sample, the data suggest that the industrial education programs in the sample may be characterized more by their diversity than by their uniformity.

Generalizations which were drawn on the basis of the data presented in Table V-3, pertaining to vocational agriculture,[9] are appropriate in describing the data presented in Table XI-3, pertaining to industrial education. First, the data indicate that the schools are emphasizing a multiplicity of purposes, but, with few exceptions, the mean operational scores were not extremely high. This may mean that the programs included in the study were attempting to attain more purposes than the structure for organization and operation of the programs permitted, and, thus, were tending to deal with some purposes somewhat superficially. Secondly, the data indicate that the schools varied widely in terms of the emphasis being placed on each purpose. Differences were observed not only in the purposes selected for emphasis, but, also, in the operational effort being made to attain each purpose. Hence, findings show that the programs were far more heterogeneous than homogeneous in terms of the operational effort and emphasis being put forth to attain the twenty-three purposes of industrial education.

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[9] Supra, p. 102.

TABLE XI - 3

TABLE SHOWING MEANS AND DISPERSIONS OF OPERATIONAL SCORES ASSIGNED TO SEVENTY-FIVE INDUSTRIAL EDUCATION PROGRAMS

Purpose number	$\bar{X}$	s	Low score	$\bar{X}$-1s	Q_1	Median	Q_3	$\bar{X}$+1s	High score
1	43.17	15.35	9.2	27.82	34.3	43.5	50.0	58.52	84.3
2	42.99	15.13	0.0	27.86	34.4	48.6	50.9	58.12	69.1
3	44.73	18.26	0.0	26.47	34.3	45.0	58.2	62.99	91.0
4	53.45	15.87	16.5	37.58	42.3	54.7	66.1	69.32	100.0
5	30.56	17.32	0.0	13.24	18.0	32.6	44.2	47.88	68.2
6	67.41	14.98	27.5	52.43	59.0	69.7	77.5	82.39	100.0
7	22.30	8.44	0.0	13.86	18.1	23.2	24.2	30.74	48.7
8	27.13	11.89	0.0	15.24	21.9	26.1	31.0	39.02	56.3
9	3.70	7.39	0.0	-3.69	0.0	0.0	2.8	11.09	30.9
10	5.21	9.86	0.0	-4.65	0.0	0.0	3.1	15.07	34.0
11	48.70	11.34	20.0	37.36	40.3	49.7	55.7	60.04	80.1
12	45.63	13.32	9.2	32.31	36.6	45.3	54.3	58.95	76.2
13	38.68	18.28	0.0	20.40	23.4	42.0	53.7	56.96	71.0
14	17.80	14.42	0.0	3.38	6.2	17.1	28.5	32.22	47.8
15	41.60	9.13	7.3	32.47	34.5	43.2	45.9	50.73	75.0
16	24.29	15.44	0.0	8.85	13.5	23.1	32.7	39.73	60.3
17	29.24	13.30	0.0	15.94	24.7	28.8	36.8	42.54	65.0
18	47.45	12.44	0.0	35.01	37.0	47.8	56.3	59.89	80.0
19	38.20	13.80	9.2	24.40	27.3	38.0	44.8	52.00	67.8
20	43.74	17.87	8.2	25.87	32.1	43.8	58.3	61.61	84.0
21	17.06	13.82	0.0	3.24	9.8	17.0	24.4	30.88	60.8
22	32.38	21.58	0.0	10.80	17.0	34.0	46.6	53.96	100.0
23	32.93	19.43	0.0	13.50	17.4	36.4	45.6	52.36	68.4

Effort exerted at each level. Descriptive statistical information is presented in Table XI-4 so that comparisons may be made among the several purposes and for the total list of purposes as to the relative amount of operational effort and emphasis which was being put forth to attain each of the twenty-three purposes of industrial education. The data in Table XI-4 are based on ratings assigned to the 196 teachers interviewed. Table XI-4 shows for each purpose the mean operational score (Column "a"), and, for each of three levels of operation for each purpose, the maximum score available to a school or teacher (Column "c") and the mean score obtained for each level of operation for each purpose (Column "d"). Then, the mean score for each level of operation for each purpose (Column "d") was divided by the maximum score available for each level (Column "c") to obtain a ratio of the mean score to the maximum score, and this ratio is shown in Column "e". This ratio, then, is a gauge of the extent to which the teachers in the sample, on the average, received ratings to describe the extensiveness of operation at each level. For comparative purposes, the ratios were transformed to figures comparable to rating categories on Form 9. Since the teachers were rated on a scale ranging from 0 to 4, this transformation was made by multiplying the ratio in Column "e" by four. This computation is equivalent to summing the ratings for each level of operation for each purpose and dividing by the number of teachers in the sample. Lastly, in Column "g", the ratio of the mean score for each level to the mean operational score for a purpose, (Column "d" divided by Column "a") is shown. The ratios actually represent the proportion of the mean operational score which is contributed by activity at each of the three levels of operation.

Again, the picture presented in Table XI-4 is one characterized by variability. Observation of the data in Columns "e" and "f" reveals, for each level of operation as shown by the offset arrangement of the ratios and mean ratings, the variations among the twenty-three purposes. The average ratios based on the total list of purposes was .53 for Level A, .38 for Level B, and .17 for Level C. The average of the mean ratings was 2.12 for Level A, 1.52 for Level B, and .68 for Level C. Thus, the data show that the teachers were operating at a moderately high degree of effectiveness for Levels A and B types of activities, but that they were operating to a limited extent with regard to Level C types of activities. The range of mean ratings, however, was very great. For Level A, the range was from .44 for Purpose No. 9 to 3.32 for Purpose No. 6. For Level B, the range was from .12 for Purpose No. 9 to 2.56 for Purpose No. 4. For Level C, the range was from .04 for Purposes Nos. 9, 10, and 11 to 2.12 for Purpose No. 6.

Similar differences are observed in the ratios of mean scores

TABLE XI-4

EXTENSIVENESS OF OPERATIONAL EMPHASIS FOR EACH OF THREE LEVELS OF OPERATION FOR EACH OF TWENTY-THREE PURPOSES OF INDUSTRIAL EDUCATION, SHOWING (1) RATIO BETWEEN MEAN SCORE TO MAXIMUM SCORE FOR EACH LEVEL, AND (2) RATIO OF MEAN SCORE FOR EACH LEVEL TO MEAN OPERATIONAL SCORE

	a	b	Column c	d	e	f	g
Purpose No.	Mean operational score	Level	Score for each level: Maximum score*	Score for each level: Mean score	Ratio of mean score to maximum score (d / c)	Mean rating**	Ratio of mean score to operational score (d / a)
1	44.91	A	37.0	22.88	.62	2.48	.51
		B	26.0	12.12	.47	1.88	.27
		C	37.0	9.91	.27	1.08	.22
2	48.20	A	39.0	26.24	.67	2.68	.55
		B	40.0	20.58	.51	2.04	.43
		C	21.0	1.38	.66	2.64	.03
3	46.22	A	37.0	23.03	.62	2.48	.50
		B	27.0	11.77	.44	1.76	.26
		C	36.0	11.42	.32	1.28	.25
4	58.75	A	33.0	24.30	.74	2.96	.41
		B	35.0	22.30	.64	2.56	.38
		C	32.0	12.15	.38	1.52	.21
5	35.39	A	42.0	23.05	.55	2.20	.65
		B	31.0	11.01	.36	1.44	.31
		C	27.0	1.33	.05	.20	.04
6	71.24	A	36.0	29.82	.83	3.32	.42
		B	38.0	27.69	.73	2.92	.39
		C	26.0	13.73	.53	2.12	.19
7	21.83	A	31.0	16.60	.54	2.16	.76
		B	33.0	2.54	.08	.32	.12
		C	36.0	2.69	.07	.28	.12
8	31.80	A	30.0	19.53	.65	2.60	.61
		B	32.0	8.40	.26	1.04	.26
		C	38.0	3.87	.10	.40	.12

*See Table XI-1

**Based on maximum rating of 4.00, as used on Form 9. (See Form 9 in Appendix A.) Computed by multiplying 4.00 by the ratio in Column e.

TABLE XI-4 (Continued)

Purpose No.	Mean operational score	Level	Score for each level: Maximum score*	Score for each level: Mean score	Ratio of mean score to maximum score (d / c)	Mean rating**	Ratio of mean score to operational score (d / a)
	a	b	c	d	e	f	g
9	7.03	A	55.0	6.21	.11	.44	.89
		B	22.0	.64	.03	.12	.09
		C	23.0	.18	.01	.04	.03
10	10.55	A	59.0	9.70	.16	.64	.92
		B	18.0	.64	.04	.16	.06
		C	23.0	.21	.01	.04	.02
11	48.44	A	40.0	30.65	.77	3.08	.63
		B	31.0	17.38	.56	2.24	.36
		C	29.0	.41	.01	.04	.01
12	50.31	A	37.0	24.84	.67	2.68	.49
		B	35.0	18.87	.54	2.16	.38
		C	28.0	6.60	.24	.96	.13
13	44.18	A	34.0	21.58	.63	2.52	.49
		B	34.0	13.30	.39	1.56	.30
		C	32.0	9.30	.29	1.16	.21
14	18.50	A	37.0	11.73	.32	1.28	.64
		B	40.0	6.00	.15	.60	.32
		C	23.0	.77	.03	.12	.04
15	42.21	A	40.0	26.37	.66	2.64	.62
		B	29.0	15.22	.52	2.08	.36
		C	31.0	.62	.02	.08	.02
16	24.92	A	41.0	16.78	.41	1.64	.67
		B	33.0	5.29	.16	.64	.21
		C	26.0	2.85	.11	.44	.12
17	30.10	A	54.0	26.57	.49	1.96	.88
		B	26.0	3.44	.13	.52	.12
		C	20.0	.09	.05	.20	.00

TABLE XI-4 (Continued)

	Column a	b	c	d	e	f	g
Purpose No.	Mean operational score	Level	Maximum score*	Mean score	Ratio of mean score to maximum score (d / c)	Mean rating**	Ratio of mean score to operational score (d / a)
18	51.31	A	46.0	31.55	.69	2.76	.62
		B	22.0	12.27	.56	2.24	.24
		C	32.0	7.49	.23	.92	.15
19	38.24	A	37.0	20.20	.55	2.20	.53
		B	34.0	13.05	.38	1.52	.34
		C	29.0	4.99	.17	.68	.13
20	50.65	A	33.0	21.06	.64	2.56	.42
		B	36.0	19.52	.54	2.16	.38
		C	31.0	10.07	.32	1.28	.20
21	18.03	A	39.0	13.13	.34	1.36	.73
		B	29.0	4.41	.15	.60	.24
		C	32.0	.49	.02	.08	.03
22	40.55	A	42.0	21.66	.52	2.08	.53
		B	26.0	10.75	.41	1.64	.27
		C	32.0	8.13	.25	1.00	.20
23	39.01	A	39.0	20.86	.53	2.12	.53
		B	26.0	8.52	.33	1.32	.22
		C	35.0	9.63	.28	1.12	.25
Total (average)	37.93	A	39.91	21.24	.53	2.12	.56
		B	30.57	11.53	.38	1.52	.30
		C	29.52	5.16	.17	.68	.14

Note: The mean operational scores presented in this table are for the 196 teacher sincluded in the sample. Hence, the mean operational scores presented in this table are not identical with the mean operational scores for the 75 school sample presented in Table XI-3.

for each level of operation to the mean operational score for each purpose, as are presented in Column "g". The average contribution of the average score for Level A was 56 per cent, for Level B, 30 per cent, and for Level C, 14 per cent. But, for Level A, the contribution ranged from a low of 41 per cent for Purpose No. 4 to a high of 92 per cent for Purpose No. 10. The range in contribution for Level B scores was from a low of 6 per cent for Purpose No. 10 to a high of 43 per cent for Purpose No. 2. For Level C, the range was from a low of 0 per cent for Purpose No. 17 to a high of 25 per cent for Purposes Nos. 3 and 23.

Summary

Taken together the data in Tables XI-3 and XI-4 show (1) that the industrial education programs in the sample were delving into a multiplicity of areas, (2) that intensive effort was being made to attain only a few purposes, and (3) that for many purposes there was little activity beyond the study and discussion types of activities implied in Level A. As was found in analyzing the operational scores for vocational agriculture reported in Tables V-3 and V-4,[10] the fact of variability was also a major finding in this part of the study. Operational scores varied widely not only among the list of twenty-three purposes, but, also, within each purpose. The greatest contribution was made to the total score by the scores attributable to activities at Level A, followed closely by the activities attributable to Level B, with, generally, the operations attributable to Level C having a minor impact on the total score. However, there was considerable variation among the purposes with regard to the relative amount of contribution and the relative amount of activity at each of the three levels.

III. THE EXTENT TO WHICH SCHOOLS WERE OPERATING PROGRAMS OF INDUSTRIAL EDUCATION IN AGREEMENT WITH THE RELATIVE IMPORTANCE OF THE PURPOSES

One of the basic questions posed in the initial design of the research project was to ascertain the extent to which schools are operating programs of industrial education which manifest the social, economic, and technical trends identified in Part I of the study. The issues involved in this question may be examined by analyzing previously reported data. Scores assigned by Jury II to the twenty-three purposes of industrial education were presented in Chapter X. Operational scores indicative of the relative operational effort and emphasis being put forth to attain each of the

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[10] Supra, pp. 101, 103-105.

twenty-three purposes have been presented in the present chapter. Section III, therefore, examines the relationship between the purpose scores reported in Chapter X and the operational scores reported in Section II of the present chapter.

The Relationship Between Purpose Scores and Operational Scores

The relationship between the extent to which schools were operating programs of industrial education in accordance with the relative importance of the purposes assigned by Jury II was analyzed both by computing regression equations and correlation coefficients. The regression and correlation data are presented in Table XI-5.

The extent of agreement between the scores assigned by Jury II and the mean operational scores. The initial discussion of the agreement between purpose scores and operational scores is centered on analyses by the regression equation as shown in Table XI-5. The computations presented in the present sub-section are based on the assumption that the true relationship between operational scores and purpose scores was linear. In performing the computations, the purpose scores were considered the independent variables and were designated the "X" scores. The operational scores were considered the dependent variables and were designated the "Y" scores. The regression equation, therefore, was $Y = a + bX$. All of the data needed for the computation of the regression equation are shown in Table XI-5.

From the data in Table XI-5, a "b" value of .01341 was obtained. This value of "b" did not differ significantly from zero. The value of r^2, the sum of squares around the regression line accounted for by regression, divided by the total sum of squares of scores around the regression line, or 12.96 divided by 5100.36, was .0025. This means that only .25 per cent of the variation in scores around the regression line was attributable to regression. The product moment correlation coefficient between the operational scores and the purpose scores was .05, and the rank order correlation coefficient was .01. The data, therefore, show that there was no relationship between the magnitude of the purpose scores assigned by Jury II and the magnitude of the scores assigned to schools for operations, and that the schools were emphasizing purposes in a random order.

The agreement between operational scores and purpose scores assigned by three sub-juries. Product moment and rank order correlation coefficients were computed between the operational scores and the scores assigned by the three sub-juries which comprised Jury II. The three sub-juries included specialists in school administration, curriculum construction, and industrial education.

TABLE XI-5

LINEAR REGRESSION AND CORRELATION DATA PRESENTED TO EXAMINE THE RELATIONSHIP BETWEEN SCORES ASSIGNED TO PURPOSES OF INDUSTRIAL EDUCATION FOR IMPORTANCE AND MEAN OPERATIONAL SCORES

Mean Operational Scores			Scores Assigned by Total Jury and Sub-Juries							
(Y Scores)			Total Jury (X_t Scores)		Adminis. (X_a Scores)		Curriculum (X_c Scores)		Ind. Educ. (X_i Scores)	
Rank	Score	No.	Rank	Score	Rank	Score	Rank	Score	Rank	Score
1	67.41	6	1	679	1	165	2	278	4	236
2	53.45	4	20	504	12	124	23	199	20	181
3	48.70	11	5	624	4	141	5	254	6	229
4	47.45	18	18	539	16.5	118	18	223	15	198
5	45.63	12	2	669	2	155	1	284	5	230
6	44.73	3	22	493	15	119	21	210	22	164
7	43.74	20	7	613	10.5	125	4	260	7	228
8	43.17	1	13	561	8	129	8.5	245	18	187
9	42.99	2	10	580	9	126	16	228	8	226
10	41.60	15	21	494	20	112	20	216	21	166
11	38.68	13	12	567	7	135	13	238	17	194
12	38.20	19	8	594	5	140	8.5	245	12	209
13	32.93	23	17	546	19	114	19	217	11	215
14	32.38	22	14	560	18	116	22	204	3	240
15	30.56	5	15	557	13	122	13	238	16	197
16	29.24	17	16	552	21	110	15	236	14	206
17	27.13	8	3	633	3	146	3	266	10	221
18	24.29	16	19	526	23	105	13	238	19	183
19	22.30	7	17	451	22	109	17	227	23	115
20	17.80	14	9	585	16.5	118	10	242	9	225
21	17.06	21	11	568	14	121	11	240	13	207
22	5.21	10	6	621	10.5	125	7	251	1	245
23	3.70	9	4	632	6	139	6	252	2	241

$\Sigma Y = 798.35$ $\Sigma X = 13148$

$\Sigma Y^2 = 32811.78$ $\Sigma X^2 = 7588164$

$\bar{Y} = 34.71$ $\bar{X} = 571.65$

$\Sigma XY = 457345.15$

$b = .0134$ $S_b = .058$

$t = .2312$ $r^2 = .0025$

Correlation Coefficients	Product moment	Rank order
$Y-X_t$	.05	.01
$Y-X_a$	.37	.36
$Y-X_c$	.00	-.04
$Y-X_i$	-.09	-.11

The results of these correlations also are shown in Table XI-5. The product moment correlation coefficient between the mean operational scores and the administration sub-jury scores was .37, and the rank order correlation coefficient was .36. The product moment correlation coefficient between the mean operational scores and the curriculum sub-jury was zero, and the rank order correlation coefficient was -.04. The product moment correlation coefficient between the mean operational scores and the industrial education sub-jury was -.09, and the rank order correlation coefficient was -.11. In no instance do the correlation coefficients differ significantly from zero.

Further analyses of the data were made to ascertain if the correlation coefficients between the three sub-juries differed significantly. In testing the hypothesis that the three correlation coefficients, .37, 0, and -.09, were drawn from a common population, a Chi-square value of 2.48 was obtained. This value was not sufficiently high for rejection of the hypothesis at the 5 per cent level of significance; consequently, the hypothesis that the correlation coefficients were drawn from a common population was not rejected. Another test was made to ascertain if the correlation coefficient of .37, obtained for the school administration sub-jury, differed significantly from the correlation coefficient of -.09, obtained for the industrial education sub-jury. The hypothesis that the true difference between the two coefficients was zero was not rejected. Thus, it was concluded that the differences in the correlation coefficients among the three sub-juries could have occurred by chance, and that, actually, the hypothesis of substantial agreement was tenable.

The relationship between purpose scores and operational scores, based on type of program. To study further the extent of relationship between the operational emphasis and effort which was being put forth to attain the purposes, and the purpose scores assigned by Jury II, regression equations and correlation coefficients were computed between purpose scores and the mean operational scores for the following groupings:

1. The 19 schools in which both industrial arts and trade and industrial education programs were offered.[11]

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[11] The 19 schools included the four middle-size schools and ten large schools in which both industrial arts and trade and industrial education programs were offered, as shown in Table III-4, supra, p. 52. In addition, there were five large schools out of the total of eight large schools in which both vocational agriculture and industrial education programs were

2. The 64 teachers who were assigned to teach in trade and industrial education programs, either as a full-time or part-time assignment.

3. The 56 schools in which only industrial arts programs were offered.[12]

4. The 132 teachers who were assigned to teach industrial arts classes only.

The results of the regression and correlation computations are shown in Table XI-6. In no instance do the "b" values differ significantly from zero. The product moment correlation coefficients between the purpose scores -- the "X" or independent variables -- and the mean operational scores for the trade and industrial education schools -- the "Y_{ts}" dependent variables -- and for the trade and industrial education teachers -- the "Y_{tt}" dependent variables -- were .13 and .18, respectively. These coefficients were higher, but not significantly higher, than the coefficients of -.02 and .05 which were obtained for the industrial arts schools -- the "Y_{is}" dependent variables -- and the industrial arts teachers -- the "Y_{it}" dependent variables, respectively.

A product moment correlation coefficient was computed between the mean operational scores for the schools offering trade and industrial programs in addition to industrial arts (the "Y_{ts}" scores) and for the schools offering industrial arts only (the "Y_{is}" scores). A coefficient also was computed between the mean operational scores for the teachers who taught part-time or full-time in trade and industrial education programs (the "Y_{tt}" scores) and for the teachers who taught industrial arts only (the "Y_{it}" scores). These coefficients are shown in Table XI-6. The coefficient between the scores of the two groups of schools was .93, and the coefficient between the two groups of teachers was .90. In each instance, a hypothesis that the true

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offered, which offered both trade and industrial education and industrial arts. These five schools were grouped with the schools offering both industrial education programs.

[12]The 56 schools included ten small schools offering industrial arts only, eleven small schools offering both industrial arts and vocational agriculture, ten middle-size schools offering industrial arts only, twelve middle-size schools offering both industrial arts and vocational agriculture, ten large schools offering industrial arts only, and three large schools offering both industrial arts and vocational agriculture. See Table III-4, supra, p. 52.

TABLE XI-6

LINEAR REGRESSION AND CORRELATION DATA PRESENTED TO EXAMINE THE RELATIONSHIP BETWEEN PURPOSE SCORES AND MEAN OPERATIONAL SCORES FOR (1) 19 PROGRAMS OF BOTH TRADE AND INDUSTRIAL EDUCATION AND INDUSTRIAL ARTS, (2) 64 TEACHERS OF TRADE AND INDUSTRIAL EDUCATION, (3) 56 PROGRAMS OF INDUSTRIAL ARTS, AND (4) 132 TEACHERS OF INDUSTRIAL ARTS

Jury II Purpose Scores		Mean Operational Scores for Trade and Industrial Education		Mean Operational Scores for Industrial Arts only	
No.	Score (X)	Schools N = 19 (Y_{ts})	Teachers N = 64 (Y_{tt})	Schools N = 56 (Y_{is})	Teachers N = 132 (Y_{it})
1	561	46.77	51.70	41.95	41.70
2	580	52.62	56.34	39.72	44.34
3	493	46.78	48.10	44.03	45.32
4	504	62.13	68.77	50.51	54.81
5	557	42.36	47.04	26.56	29.87
6	679	74.26	79.97	65.08	67.11
7	451	20.54	18.67	22.90	23.33
8	633	33.72	42.09	24.90	26.82
9	632	10.85	14.36	1.27	3.56
10	621	16.17	24.16	1.48	4.11
11	624	50.89	50.61	47.95	47.42
12	669	52.18	57.71	43.41	46.81
13	567	49.49	57.16	35.01	38.02
14	585	24.56	26.68	15.51	14.63
15	494	42.60	44.67	41.26	41.05
16	526	28.26	31.83	22.94	21.64
17	552	32.62	34.10	28.10	28.21
18	539	55.78	61.03	44.62	46.70
19	594	40.79	43.16	37.32	35.92
20	613	55.65	64.09	39.70	44.28
21	568	20.61	23.15	15.86	15.61
22	560	48.50	61.52	26.91	30.62
23	546	45.92	53.72	28.52	32.05

X-Y_{ts}: b = .0365; S_b = .0588; $t_{b=0}$ = .612; r = .132; r^2 = .0175
X-Y_{tt}: b = .0552; S_b = .0641; $t_{b=0}$ = .860; r = .184; r^2 = .0340
X-Y_{is}: b = .0584; S_b = .0584; $t_{b=0}$ = .097; r = .021; r^2 = .0004
X-Y_{it}: b = .0129; S_b = .0596; $t_{b=0}$ = .216; r = .047; r^2 = .0022
Y_{ts}-Y_{is}: b = .9009; S_b = .0795; $t_{b=0}$ = 11.340; r = .927; r^2 = .8602
Y_{tt}-Y_{it}: b = .8190; S_b = .0888; $t_{b=0}$ = 9.221; r = .895; r^2 = .8019

correlation was zero was rejected at the .1 per cent level of significance.

The data in Table XI-6 show, then, that although there was a slightly higher relationship between the purpose scores and the mean operational scores for teachers and schools involved in trade and industrial education programs, the trend was not statistically significant. The data also show that the order of emphasis of purposes was practically the same for both groups of schools and both groups of teachers.[13]

Summary of regression and correlation analyses. Summarized, the statistical tests applied to ascertain whether the programs of industrial education in the 75 school sample were emphasizing the purposes in the order in which they were scored and ranked by the Jury indicated that no relationship existed between the order in which purposes were scored and ranked by Jury II and the operational scores assigned to the schools either when the total Jury was concerned or when the sub-juries of Jury II were concerned. In addition, no relationship was found to exist between the order in which purposes were scored and ranked by Jury II and the mean operational scores for the following groupings: (a) schools offering both industrial arts and trade and industrial education programs, (b) schools offering industrial arts only, (c) teachers who taught full- or part-time in trade and industrial education programs, and (d) teachers who taught industrial arts only.

Agreement Between Purpose Scores Assigned by School Raters and Operational Scores

The present sub-section deals with the question of whether schools were tending to emphasize the purposes, as indicated by mean operational scores, in the order in which the purposes were scored and ranked by school raters in terms of acceptance as goals of the industrial education programs in the 75 schools.[14] The correlation and regression data discussed in this sub-section are presented in Table XI-7.

The extent of agreement between the scores assigned by school raters and the mean operational scores. The extent of agreement

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[13] For results of additional analyses of the operational scores for the two groups of schools and the two groups of teachers, in which highly significant differences were obtained, see infra, pp. 301-306.

[14] These are the scores computed from returns of Form B, and which were reported in Chapter X, supra, pp. 248.

TABLE XI-7

LINEAR REGRESSION AND CORRELATION DATA PRESENTED TO EXAMINE THE RELATIONSHIP BETWEEN SCORES ASSIGNED TO PURPOSES OF INDUSTRIAL EDUCATION BY SCHOOL RATERS AND MEAN OPERATIONAL SCORES

Purpose No.	(Purpose scores (School raters) (X) Rank	Score	Operational scores (Y) Rank	Score	Predicted and differential values of "Y" $\hat{Y}$*	$Y-\hat{Y}$*	P
4	14	267	2	53.45	36.01	17.44	NS
23	20	220	13	32.93	21.93	11.00	NS
6	1	344	1	67.41	59.09	8.32	NS
22	18	233	14	32.38	25.82	6.56	NS
15	15	265	10	41.60	35.41	6.19	NS
3	7	279	6	44.73	39.61	5.12	NS
1	10.5	276	8	43.17	38.71	4.46	NS
20	8.5	278	7	43.74	39.31	4.43	NS
2	8.5	278	9	42.99	39.31	3.68	NS
18	4	298	4	47.45	45.30	2.15	NS
13	12.5	269	11	38.68	36.61	2.07	NS
5	16	242	15	30.56	28.52	2.04	NS
12	5	295	5	45.63	44.40	1.23	NS
10	23	161	22	5.21	4.25	.96	NS
21	22	205	21	17.06	17.43	-.37	NS
14	21	212	20	17.80	19.53	-1.73	NS
11	2	317	3	48.70	51.00	-2.30	NS
19	6	285	12	38.20	41.41	-3.21	NS
16	17	240	18	24.29	27.92	-3.63	NS
17	12.5	269	16	29.24	36.61	-7.37	NS
7	10.5	276	19	22.30	38.71	-16.41	NS
8	3	303	17	27.13	46.80	-19.67	.05
9	19	229	23	3.70	24.62	-20.92	.05

$\sum X = 6041$ $\quad \sum Y = 798.35$

$\sum X^2 = 1622861$ $\quad \sum Y^2 = 32811.78$

$\bar{X} = 262.52$ $\quad \bar{Y} = 34.71$

$\sum XY = 220532.51$

$a = -44.00$; $b = .29967$; $S_b = .04935$; $t = 6.07$

Product moment $r = .80$; $r^2 = .64$; Rank order rho = .71

* $\hat{Y}_i = a + bX_i = -44.00 + .29967\ X_i$

between the scores assigned by school raters and the mean operational scores was determined by the regression equation. The regression equation was Y = a + bX, or Y = -44.00 + .29967 X. The effectiveness of "b" as a predictor of the "Y" scores was determined by a "t" test in which $\underline{t}$ = (.29967 - 0) / .04935, or 6.07. Thus, the hypothesis that the true value of "b" is zero was rejected at the .1 per cent level of significance. The proportion of variation of scores around the line of regression attributable to regression was ascertained by dividing the sum of squares attributable to regression (3249.67) by the total sum of squares (5100.36), for which a value for r^2 of .64 was obtained. Hence, 64 per cent of the variation of scores around the regression line was found to be attributable to regression. The product moment correlation coefficient between the mean operational scores and the scores assigned to purposes by the school raters for purpose acceptance was .80, and the rank order coefficient was .71, according to the data in Table XI-7. These data, therefore, support the conclusion that the schools were tending to emphasize and exert effort to attain the individual purposes in the order in which the purposes were accepted as goals in the industrial education programs in the sample. And, moreover, the results denote a much closer relationship between the order of purpose emphasis, as measured by the mean operational scores, and the order of purpose acceptance, than between the order of emphasis and the order of importance as determined by the scores assigned to purposes by Jury II.

Analyses of variations for individual purpose items. Using the regression equation, Y = -44.00 + .29967 X, a predicted score was computed for each of the "X" scores. The differentials between the obtained "Y" scores, or the mean operational scores, and the predicted "Y" scores were determined. The differentials are shown in Table XI-7, listed in descending order of magnitude of the differentials between the obtained "Y's" and the predicted "Y's".

The data in Table XI-7 show that the largest differentials were obtained for Purposes Nos. 4, 7, 8, and 9. For Purpose No. 4, the data indicate that the schools were exerting more effort to attain the purpose than could be justified by the score assigned by the school raters denoting acceptance of the purpose as a goal of the industrial education programs in the schools. This purpose, "to assist students in developing identification skills . . . involved in industrial processes," was ranked fourteenth according to purpose acceptance and second according to operational scores. For the other three purposes, Purposes Nos. 7, 8, and 9, the magnitude of the negative differentials denote that the schools were tending not to exert effort to attain these purposes in agreement with the extent to which the purposes were accepted as goals. Purpose No. 7, "to assist persons in developing

interests and abilities of an avocational nature . . . which are related to industrial processes," was ranked 10.5 according to the scores based on purpose acceptance, and nineteenth according to mean operational scores. Purpose No. 8, "to assist high school students in formulating realistic occupational goals," was ranked third according to purpose acceptance and seventeenth according to operational scores. Purpose No. 9, "to assist persons established as an industrial worker in adjusting to changing needs, goals, and opportunities in industrial occupations," was ranked nineteenth according to purpose acceptance, and twenty-third according to mean operational scores.

Statistical tests were performed to determine the extent to which the differentials deviated from a fitted relationship.[15] In only two instances did the obtained value exceed 2.08, the critical value of t at the 5 per cent level of significance, with 21 degrees of freedom. Differentials for Purposes Nos. 8 and 9 deviated significantly from a fitted regression at the 5 per cent level of significance. The remaining twenty-one observations did not deviate significantly from the fitted regression line.

The extent of agreement between the acceptance of individual purposes and operational scores. To examine further the relationship between the extent to which each purpose was accepted as a goal in the industrial education program of the school and the operational scores assigned to the schools by the research staff, a series of null hypotheses was set up to the effect that operational scores were independent of the quantitative ratings assigned by the schools on Form 8.[16] The results of these tests are shown in Table XI-8. Table XI-8 also shows the frequency distribution indicating the

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[15] In this instance,

$$t = \frac{Y_i - \hat{Y}_i}{\sqrt{\frac{SSE}{n-2}\left(1 - \frac{1}{n} - \frac{(Y_i - \bar{X})^2}{X^2 - \frac{(X)^2}{n}}\right)}}$$

where SSE is the error sum of squares, or the total sum of squares of deviations around the regression line minus the sum of squares attributable to regression (SSE = TSS - SSR). Cf. M.H. Quenoille, Associated Measurements (New York: Academic Press, Inc., 1952), p. 66.

[16] See infra, pp. A-37 ff.

TABLE XI - 6

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN ACCEPTANCE OF PURPOSE ITEMS BY SCHOOLS AND MEAN OPERATIONAL SCORES FOR TWENTY-THREE PURPOSES OF INDUSTRIAL EDUCATION

		Extent of Purpose Acceptance										
		No extent (1)		Limited extent (2)		Moderate extent (3)		Considerable extent (4)		Very great extent (5)		
No.	Rank	N	Means	N	Means	N	Means	N	Means	N	Means	P
1	13	1	25.0	6	29.2	17	40.8	43	46.9	8	41.0	.05
2	10	1	0	6	27.5	22	39.6	31	47.2	15	48.3	.001
3	22	2	28.8	7	35.4	18	37.2	31	47.5	17	53.4	.05
4	20	1	51.0	6	47.6	27	48.4	32	55.9	9	64.1	NS
5	15	3	0	13	18.6	28	30.1	26	38.4	5	41.4	.001
6	1	0	—	1	52.5	1	77.5	26	63.7	47	69.5	NS
7	23	1	0	4	24.8	25	21.0	33	23.1	12	23.6	NS
8	3	0	—	1	15.0	16	22.8	37	26.7	21	31.7	NS
9	4	9	0	14	0.7	25	5.1	18	3.3	9	9.0	.05
10	6	41	0.6	9	8.0	9	6.4	5	13.7	11	15.1	.001
11	5	0	—	6	35.5	8	44.6	24	48.7	37	51.7	.01
12	2	0	—	3	32.9	20	46.8	31	46.0	21	45.8	NS
13	12	1	0	12	24.9	15	37.2	36	44.8	11	39.1	.01
14	9	7	7.9	24	20.0	26	16.2	11	18.3	7	25.4	NS
15	21	1	34.5	13	39.3	19	38.4	29	43.6	13	44.5	NS
16	19	5	8.0	11	17.1	30	21.4	22	34.1	7	28.6	.001
17	16	1	0	12	23.2	21	27.3	24	33.5	17	31.5	.05
18	18	0	—	7	39.1	12	39.6	32	48.6	24	52.3	.01
19	8	2	9.2	4	32.6	22	35.2	26	39.6	21	43.4	.01
20	7	2	30.3	5	26.3	20	37.2	34	46.5	14	54.4	.01
21	11	10	5.2	21	13.3	27	20.4	13	26.3	4	13.9	.001
22	14	8	11.9	20	24.6	19	32.3	12	43.7	16	44.0	.001
23	17	9	13.4	27	28.1	12	40.9	14	43.3	13	38.0	.001

number of school raters accepting the purpose for each response category, namely, (1) no extent, (2) limited extent, (3) moderate extent, (4) considerable extent, and (5) very great extent.

Examination of the data in Table XI-8 indicates that the mean operational scores tended to increase as the numerical response category increased. Of twenty-three hypotheses tested, sixteen were rejected, four at the 5 per cent level of significance, five at the 1 per cent level, and seven at the .1 per cent level. The results of these tests of significance, then, substantiate the agreement between operational scores and the acceptance of purposes which was established by the analyses of data by regression and correlation methods.

Summary. The data presented in the present sub-section of Section III support the conclusion that the schools were operating programs of industrial education, as measured by mean operational scores determined for each purpose, in substantial agreement with the extent to which the purposes were accepted as goals of the industrial education programs of the schools. This conclusion is based on the following findings: (1) the magnitude of the regression coefficient indicated that there was practically no possibility of non-relationship, (2) the value of r^2 indicated that 64 per cent of the variations of scores could be attributable to regression, (3) the analyses of deviations from the fitted regression line indicated that only two purposes deviated significantly from the regression line and that these deviations were significant at the 5 per cent level of significance, and (4) of a series of twenty-three F tests applied to test the hypothesis that operational scores were independent of the quantitative response categories indicating acceptance of purpose as goals of the industrial education programs, sixteen were rejected.

Summary of the Section

With regard to providing an answer to the question posed at the beginning of the section -- to what extent are programs of industrial education currently in existence operating so as to manifest the contemporary social, economic, and technical trends previously identified in the research -- analyses of relationship indicated that there was practically no agreement between the scores assigned to schools indicative of operational effort and emphasis being exerted to attain purposes and the order in which the purposes were scored and ranked by Jury II. The latter scores were assumed to represent a quantitative value indicative of the relative importance of the purposes established in light of the social, economic, and technical trends previously identified. When, however, the operational scores were studied in relation-

ship to the extent to which the purposes were accepted as goals of the industrial education programs in the schools, a highly significant relationship was obtained. These findings clearly indicated that the schools were exerting effort to attain the purposes in the order in which they were accepted as goals by school raters. The findings also indicate that the school raters, as a group, were not in agreement with Jury II with regard to the importance of the purposes; hence, there was little or no statistical evidence of agreement between the order in which purposes were emphasized, as denoted by mean operational scores, and the order in which purposes were scored and ranked by the jury.

IV. THE RELATIONSHIP BETWEEN OPERATIONAL SCORES FOR TWENTY-THREE PURPOSES OF INDUSTRIAL EDUCATION AND SELECTED VARIABLES

Section IV presents the results of tests of the following null hypotheses:

1. There is no difference in the mean operational score for each of the twenty-three purposes of industrial education when schools are grouped according to size.

2. There is no difference in the mean operational score for each of the twenty-three purposes of industrial education when schools are grouped according to whether schools offer industrial education programs only or both vocational agriculture and industrial education programs.

3. There is no difference in the mean operational score for each of the twenty-three purposes of industrial education when schools are grouped according to whether schools offer industrial arts only or trade and industrial education programs with industrial arts.

4. There is no difference in the mean operational score for each of the twenty-three purposes of industrial education when schools are grouped according to geographical location.

5. There is no difference in the mean operational score for each of the twenty-three purposes of industrial education when schools are grouped according to assessed valuation per enrolled pupil.

The first three hypotheses originally were postulated in Chapter III, and were used to stratify the sample of schools.

Schools also were stratified according to geographical location in order to maximize the dispersion of schools within the state, as was outlined in Chapter III. The hypothesis pertaining to assessed valuation was tested in order to determine whether this variable was related to variation in operational scores. The subsections of Section IV present the report of the tests of the 161 null hypotheses, all of which were tested by single classification analysis of variance.

The Relationship Between School Size and Operational Scores

It was indicated in Chapter III that three discrete size groups were selected, and samples were drawn from the schools in these size groups so that the relationship between size of school and operational scores could be analyzed as accurately as possible. The size groups were a small-size group, including schools enrolling from 100 to 150 students; a medium-size group, including schools enrolling from 300 to 450 students; and a large-size group consisting of schools enrolling 600 or more students. The data in Table XI-9 show that the mean operational scores of the schools in the large-size group tended to surpass the mean operational scores of the large-size group for twenty-one of the twenty-three purposes. Of the null hypotheses tested to the effect that operational scores were independent of size of schools, eleven hypotheses were rejected, two at the 5 per cent level of significance, five at the 1 per cent level, and four at the .1 per cent level.

To study the relationship between size of school and operational scores where the influence of operations of trade and industrial education programs is removed, a second series of tests was performed with the schools offering industrial arts only. The results of these tests are shown in Table XI-10. Again, the data show that the large schools generally received higher scores than the middle-size or small schools. However, of the twenty-three null hypotheses tested, only three were rejected. Significant differences were obtained for Purpose No. 9, " to assist persons established as an industrial worker in adjusting to changing needs, goals, and opportunities in industrial occupations," Purpose No. 10, "to assist currently employed workers in upgrading their level of occupational proficiency," and Purpose No. 20, "to assist students in developing abilities to form sound judgments and solve problems related to industrial processes." Thus, two of the three purposes, for which significant differences were obtained, pertained to the extensiveness of adult education programs in the school.

As far as size is concerned, then, the data would indicate that size was identified as a variable which was related significantly to variations in operational scores. There were indications, however, that the variations were more likely to be influenced by whether the

TABLE XI - 9

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN SIZE OF SCHOOL AND MEAN OPERATIONAL SCORES FOR TWENTY-THREE PURPOSES OF INDUSTRIAL EDUCATION

Purpose No.	Rank	Size of School: Small N = 21	Medium N = 26	Large N = 28	P
1	13	43.75	40.57	45.16	NS
2	10	39.64	38.17	49.98	.01
3	22	44.12	44.47	45.42	NS
4	20	47.65	50.45	60.59	.01
5	15	23.07	30.19	36.52	.05
6	1	65.76	63.81	71.98	NS
7	23	22.30	24.52	20.25	NS
8	3	23.24	25.49	31.58	.05
9	4	0	1.02	8.97	.001
10	6	0	1.82	12.26	.001
11	5	49.12	46.12	50.78	NS
12	2	40.07	42.52	52.69	.01
13	12	34.00	35.47	45.17	NS
14	9	18.49	13.91	20.90	NS
15	21	40.74	41.65	42.18	NS
16	19	25.36	20.10	27.37	NS
17	16	27.79	26.65	32.75	NS
18	18	44.81	43.59	53.01	.01
19	8	37.96	41.02	38.09	NS
20	7	34.12	40.10	54.33	.001
21	11	11.78	19.65	18.63	NS
22	14	21.10	27.63	45.26	.001
23	17	28.80	26.35	42.13	.01

TABLE XI - 10

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN SIZE OF SCHOOLS OFFERING INDUSTRIAL ARTS PROGRAMS ONLY AND MEAN OPERATIONAL SCORES FOR TWENTY-THREE PURPOSES OF INDUSTRIAL EDUCATION

Purpose No.	Rank	Size of School: Small N = 21	Medium N = 22	Large N = 13	P
1	13	43.75	40.04	42.26	NS
2	10	39.64	35.06	47.74	NS
3	22	44.12	43.65	44.51	NS
4	20	47.65	49.63	56.60	NS
5	15	23.07	27.88	29.93	NS
6	1	65.76	61.65	69.77	NS
7	23	22.30	25.09	20.15	NS
8	3	23.24	25.34	26.84	NS
9	4	0	0	5.51	.01
10	6	0	0	6.39	.001
11	5	49.12	45.12	50.84	NS
12	2	40.07	41.63	51.79	.05
13	12	34.00	33.28	39.57	NS
14	9	18.49	11.47	17.52	NS
15	21	40.74	41.78	41.18	NS
16	19	25.36	18.36	26.77	NS
17	16	27.79	25.87	32.38	NS
18	18	44.81	42.04	48.66	NS
19	8	37.96	37.06	36.73	NS
20	7	34.12	38.58	50.59	.05
21	11	11.78	18.31	18.31	NS
22	14	21.10	25.32	39.01	NS
23	17	28.80	24.85	34.27	NS

schools offered trade and industrial education programs in addition to industrial arts than by size per se.

The Relationship Between Programs Offerings and Operational Scores

The issue involved in the series of statistical tests reported in the present sub-section pertains to the question of whether schools operate more effectively or less effectively when they attempt to offer one or two practical arts programs for boys. The null hypothesis was that the operational scores are independent of whether the schools offer industrial education only or both vocational agriculture and industrial education. The testing of twenty-three hypotheses was restricted to the industrial arts programs, again to eliminate the influence of the trade and industrial education programs.

The results of the hypotheses, made by the application of the single classification analyses of variance, are shown in Table XI-11. In each of the twenty-three instances, the null hypothesis was not rejected. Closer examination of the data indicate there was no consistent pattern as to which are superior, the schools which offer industrial arts only or the schools which offer both industrial arts and vocational agriculture.

The Relationship Between Type of Industrial Education Program Offered and Mean Operational Scores

Two series of twenty-three hypotheses each were formulated and tested to the effect that the mean operational scores were independent (1) of whether the schools offered industrial arts only or both industrial arts and trade and industrial education programs, and (2) of whether the teachers taught industrial arts only or taught part- or full-time in trade and industrial education programs. The results of the tests of significance are presented in Tables XI-12 and XI-13.

Table XI-12 shows the results of tests applied to determine the relationship between the variable of whether schools offered industrial arts only or trade and industrial education programs with industrial arts and the mean operational scores for twenty-three purposes of industrial education. The data in Table XI-12 show that the schools which were offering trade and industrial education programs in addition to industrial arts scored higher than the schools offering industrial arts only for twenty-two of the twenty-three purposes of industrial education. Only in the instance of Purpose No. 7, ranked twenty-third by Jury II, "to assist students in developing interests and abilities of an avocational nature . . . which are related to industrial occupations," did the schools offering industrial arts only score higher

TABLE XI-11

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIPS BETWEEN WHETHER SCHOOLS OFFERED INDUSTRIAL ARTS ONLY OR BOTH VOCATIONAL AGRICULTURE AND INDUSTRIAL ARTS AND MEAN OPERATIONAL SCORES

Purpose		Program Offerings		
		Industrial Arts Only	Both Vocational Agriculture and Industrial Arts	
No.	Rank	N = 30	N = 26	P
1	13	39.97	44.24	NS
2	10	41.48	37.70	NS
3	22	45.32	42.56	NS
4	20	50.88	50.07	NS
5	15	27.75	25.18	NS
6	1	63.32	67.12	NS
7	23	22.60	23.24	NS
8	3	24.06	25.87	NS
9	4	2.39	0	NS
10	6	2.77	0	NS
11	5	45.12	51.22	NS
12	2	46.96	41.04	NS
13	12	35.75	34.15	NS
14	9	16.56	14.30	NS
15	21	39.76	42.98	NS
16	19	24.65	20.96	NS
17	16	27.78	28.47	NS
18	18	45.94	43.10	NS
19	8	34.67	40.39	NS
20	7	42.19	36.83	NS
21	11	13.85	18.18	NS
22	14	29.85	23.41	NS
23	17	29.86	26.97	NS

TABLE XI -12

RESULTS OF TESTS OF SIGNIFICANCE TO DETERMINE RELATIONSHIP BETWEEN WHETHER SCHOOLS OFFER BOTH INDUSTRIAL ARTS AND TRADE AND INDUSTRIAL EDUCATION PROGRAMS OR INDUSTRIAL ARTS ONLY AND MEAN OPERATIONAL SCORES FOR TWENTY-THREE PURPOSES OF INDUSTRIAL EDUCATION

Purpose No.	Rank	Type of Offering A N = 56	Type of Offering B N = 19	Differences Between Means A over B	Differences Between Means B over A	P
1	13	41.95	46.77		4.82	NS
2	10	39.72	52.62		12.90	.01
3	22	44.03	46.78		2.75	NS
4	20	50.51	62.13		11.62	.01
5	15	26.56	42.36		15.80	.001
6	1	65.08	74.26		9.18	.05
7	23	22.90	20.54	2.36		NS
8	3	24.90	33.72		8.82	.01
9	4	1.27	10.85		9.58	.001
10	6	1.48	16.17		14.69	.001
11	5	47.95	50.89		2.94	NS
12	2	43.41	52.18		8.77	.05
13	12	35.01	49.49		14.48	.01
14	9	15.51	24.56		9.05	.05
15	21	41.26	42.60		1.34	NS
16	19	22.94	28.26		5.32	NS
17	16	28.10	32.62		4.52	NS
18	18	44.62	55.78		11.16	.001
19	8	37.32	40.79		3.47	NS
20	7	39.70	55.65		15.95	.001
21	11	15.86	20.61		4.75	NS
22	14	26.91	48.50		21.59	.001
23	17	28.52	45.92		17.40	.001

A - Schools offering industrial arts only.
B - Schools offering both industrial arts and trade and industrial education programs.

TABLE XI - 13

RESULTS OF TESTS OF SIGNIFICANCE TO DETERMINE RELATIONSHIP BETWEEN WHETHER TEACHERS TEACH INDUSTRIAL ARTS ONLY OR TRADE AND INDUSTRIAL EDUCATION AND MEAN OPERATIONAL SCORES FOR TWENTY-THREE PURPOSES OF INDUSTRIAL EDUCATION

Purpose No.	Rank	Type of Offering A N = 132	Type of Offering B N = 64	Differences Between Means A over B	Differences Between Means B over A	P
1	13	41.70	51.70		10.00	.001
2	10	44.34	56.34		12.00	.001
3	22	45.32	48.10		2.78	NS
4	20	54.01	68.77		14.76	.001
5	15	29.87	47.04		17.17	.001
6	1	67.11	79.97		12.86	.001
7	23	23.33	18.67	4.66		.05
8	3	26.92	42.09		15.17	.001
9	4	3.56	14.36		10.80	.001
10	6	4.11	24.16		20.00	.001
11	5	47.42	50.61		3.19	NS
12	2	46.81	57.71		10.90	.001
13	12	38.02	57.16		19.14	.001
14	9	14.63	26.68		12.05	.001
15	21	41.05	44.67		3.62	NS
16	19	21.64	31.83		10.19	.001
17	16	28.21	34.10		5.89	.05
18	18	46.70	61.03		14.33	.001
19	8	35.92	43.16		7.24	.05
20	7	44.28	64.09		19.81	.001
21	11	15.61	23.15		7.54	.01
22	14	30.62	61.52		30.90	.001
23	17	32.05	53.72		21.67	.001

A - Teaching industrial arts classes only.
B - Teaching both industrial arts and trade and industrial education or teaching trade and industrial classes only.

than the schools offering trade and industrial education in addition to industrial arts. For the remaining twenty-two purposes, the schools which offered both programs scored higher than the schools which offered only industrial arts. Of the twenty-two purposes where higher scores were received by schools offering both programs, hypotheses were rejected for fourteen purposes, three at the 5 per cent level of significance, four at the 1 per cent level, and seven at the .1 per cent level.

When the data obtained for the 196 teachers are considered, a similar pattern is observed. The teachers who were full- or part-time trade and industrial education teachers scored higher than the teachers who were full-time industrial arts teachers for the same twenty-two purposes. The full-time industrial arts teachers received a higher mean score for Purpose No. 7, pertaining to avocational abilities than did the part- or full-time trade and industrial education teachers, and the hypothesis that the true difference between the means was zero was rejected at the 5 per cent level of significance.

For the remaining twenty-two null hypotheses, formulated to the effect that the true difference between the means of the part- or full-time trade and industrial education teachers and the full-time industrial arts teachers was zero, nineteen were rejected. Two hypotheses were rejected at the 5 per cent level of significance, one at the 1 per cent level, and sixteen at the .1 per cent level. Thus the data denoted that for only four purposes did the part- or full-time trade and industrial education teachers fail to score significantly higher than the industrial arts teachers

The findings reported in Tables XI-12 and XI-13 are in marked contrast with the findings reported in Table XI-6. In Table XI-6, it was shown that there was a high degree of relationship between the mean operational scores (1) of schools offering industrial arts only and schools offering trade and industrial education programs in addition to industrial arts, and (2) of teachers who taught industrial arts only and teachers who taught part- or full-time in trade and industrial education programs. The correlation data, it should be noted, referred to the direction of scores. When the magnitude of the scores are considered, the data in Tables XI-12 and XI-13 clearly demonstrate that the schools offering trade and industrial education programs and the teachers who were teaching part- or full-time in trade and industrial education programs were exerting more effort to attain the purposes than were the schools or teachers whose programs or assignments were limited to industrial arts. This observation is pertinent regardless of whether the purposes were oriented toward industrial arts, trade and industrial education, or both industrial arts and trade and industrial

education.[15]

The Relationship Between Geographic Location and Operational Scores

In order to maximize dispersion of the schools in the sample, and, at the same time, to study relationship between location in the state and the effectiveness of operation of the programs of industrial education, the state was divided into four geographical sections. The sample was stratified according to geographical location. The sample of 75 schools included 26 schools in the north section of the state, 15 schools in the north central section, 21 schools in the south central section, and 13 schools in the south section. The results of the tests of twenty-three null hypotheses, formulated to the effect that mean operational scores were independent of location in the state, are shown in Table XI-14. Of the twenty-three hypotheses formulated, not a single hypothesis was rejected. Thus, it may be concluded that location in the state was not a variable related to variation in mean operational scores for the twenty-three purposes of industrial education.

The Relationship Between the Assessed Valuation Per Enrolled Pupil and Operational Scores

The extent to which the financial ability to support educational programs was a variable significantly related to variations in operational scores provided the basis for a series of twenty-three null hypotheses tested and reported in Table XI-15. To prepare the data for tests by the single classification analysis of variance, the schools were grouped into five classifications: (1) schools with assessed valuation per enrolled pupil in grades 1-12 of less than $5000, (2) schools with assessed valuation per enrolled pupil of $5001 to $7000, (3) schools with assessed valuation per enrolled pupil of $7001 to $9000, (4) schools with assessed valuation per enrolled pupil of $9001 to $11000, and (5) schools with assessed valuation per enrolled pupil of $11001 and over. Of the twenty-three null hypotheses formulated to the effect that operational scores were independent of the assessed valuation category, the hypotheses were rejected for only one purpose, Purpose No. 12. In this instance, schools in the $9001 to $11000 category scored highest and schools in the less than $5000 category scored lowest. Inasmuch as only one hypothesis was rejected, it appeared reasonable to conclude that assessed valuation per enrolled pupil was not a variable significantly related to variation in mean operational scores.

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[15] See Table X-9, *supra*, p. 257

TABLE XI - 14

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN LOCATION OF SCHOOL IN STATE AND MEAN OPERATIONAL SCORES OF TWENTY-THREE PURPOSES OF INDUSTRIAL EDUCATION

Purpose No.	Rank	Location in State: North N = 26	North central N = 15	South central N = 21	South N = 13	P
1	13	39.43	46.22	42.42	48.35	NS
2	10	44.99	40.91	41.41	43.95	NS
3	22	45.87	44.78	38.92	51.77	NS
4	20	53.78	53.10	54.18	52.04	NS
5	15	30.47	28.07	28.91	36.28	NS
6	1	70.70	65.12	65.92	65.85	NS
7	23	21.51	24.31	20.07	25.17	NS
8	3	28.05	30.19	23.91	26.99	NS
9	4	3.64	2.69	3.35	5.58	NS
10	6	5.62	3.43	4.32	7.84	NS
11	5	49.61	47.55	47.72	49.78	NS
12	2	45.59	46.46	42.28	50.17	NS
13	12	36.04	38.90	35.96	48.09	NS
14	9	21.11	17.72	15.54	14.91	NS
15	21	41.76	41.23	41.61	41.68	NS
16	19	21.43	23.28	25.28	29.56	NS
17	16	27.68	29.29	30.98	29.50	NS
18	18	50.66	46.69	44.97	45.89	NS
19	8	41.33	38.30	36.91	33.93	NS
20	7	46.17	38.71	40.51	49.91	NS
21	11	15.03	19.76	14.91	21.48	NS
22	14	35.41	31.47	34.12	24.56	NS
23	17	31.25	30.74	35.86	34.05	NS

TABLE XI - 15

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN ASSESSED VALUATION PER ENROLLED PUPIL AND MEAN OPERATIONAL SCORES FOR TWENTY-THREE PURPOSES OF INDUSTRIAL EDUCATION

		Assessed Valuation Per Enrolled Pupil					
No.	Rank	Less than $5000 N = 9	$5001 - 7000 N = 21	$7001 - 9000 N = 21	$9001 - 1000 N = 13	$11001 and over N = 11	P
1	13	33.60	44.26	43.85	44.98	45.50	NS
2	10	35.56	42.14	44.23	47.95	46.27	NS
3	22	37.76	44.24	49.57	45.08	41.69	NS
4	20	40.83	57.61	53.17	59.52	49.22	NS
5	15	18.77	31.10	29.51	39.05	31.14	NS
6	1	60.56	70.09	63.36	66.68	76.47	NS
7	23	24.40	21.03	24.27	22.72	18.75	NS
8	3	20.76	29.17	29.46	29.54	21.19	NS
9	4	0	2.75	4.25	6.75	3.92	NS
10	6	0	4.03	5.38	9.85	5.90	NS
11	5	45.98	48.83	49.16	52.72	45.05	NS
12	2	37.41	47.89	43.57	54.14	41.94	.05
13	12	28.94	36.11	39.03	44.62	43.85	NS
14	9	14.12	13.77	19.49	21.97	20.54	NS
15	21	39.52	42.39	41.69	41.36	41.89	NS
16	19	22.68	24.64	21.80	26.18	27.45	NS
17	16	22.78	32.73	26.31	29.14	33.61	NS
18	18	41.72	47.22	46.76	52.88	47.44	NS
19	8	33.13	38.53	36.46	43.11	39.24	NS
20	7	31.61	44.06	41.90	49.66	49.55	NS
21	11	16.16	19.95	14.41	17.55	16.78	NS
22	14	18.00	33.56	28.83	40.62	38.95	NS
23	17	23.69	33.55	35.22	37.56	29.45	NS

SUMMARY OF CHAPTER XI

Chapter XI dealt with (1) the derivation of an operational score for each of twenty-three purposes of industrial education for the 75 school sample, and (2) the analysis of the relationship between the magnitude of the operational scores and the magnitude of the purpose scores. The operational scores expressed in quantitative terms of relative amount of operational emphasis and effort being exerted to attain each purpose. The purpose scores, as assigned by a jury of educational specialists, were assumed to be a quantitative expression of the relative importance of purpose items which were based on the results of the analyses of social data reported in Part I of the study. In addition, analyses were made to ascertain the relationship between the extent to which purposes were accepted as goals of the industrial education programs in the sample and the relative amount of operational emphasis and effort being exerted to attain each purpose. Then, too, operational scores were studied to identify variables significantly related to variations in operational scores.

The derivation of operational scores involved a quadruplicate process: (1) For each of the twenty-three purposes, a series of three statements was prepared which described activities appropriate for attaining purposes at three levels of operation. (2) A jury of educational specialists -- including specialists in school administration, curriculum construction, and industrial education -- rated the industrial value of each level of operation for each purpose, and, from these ratings, a maximum operational score available for each level was derived. (3) The 75 schools in the sample were visited, teachers of industrial education were interviewed and their activities observed, and a rating was assigned to each teacher which was indicative of the extent of operational emphasis and effort being exerted to attain each purpose at each level of operation. (4) The ratings assigned to each level were translated into scores, based on the relative importance of the operation at each level as determined by the jury, and quantitative values for each level were summed to procure an operational score for each purpose for each teacher and for each school.

The findings in Chapter XI may be summarized as follows:

1. The specialists in school administration, curriculum construction, and industrial education, who comprised Jury IV, tended to disagree with regard to the relative educational value of the three levels of operation for each purpose. The administration sub-jury rated higher than did the curriculum sub-jury the Level A activities, which, generally, involved extensive use of study-discussion techniques and for which limited special facilities and resources were needed. The curriculum sub-jury

tended to rate higher than did the administration sub-jury the Levels B and C activities, which, generally, were characteristic of the experience unit concepts. The ratings of the industrial education sub-jury ranged between the ratings of the administration sub-jury and the curriculum sub-jury.

2. Although the relative value of levels of operation varied among the twenty-three purposes, the ratings of the jury indicated that the school operating at Level A should receive, on the average, an operational score not exceeding 35 points out of a possible score of 100. To be truly effective in exerting operational effort to attain a purpose, then, the judgment of the jury members indicated that students should be provided with learning activities which involve extensive student participation and experience.

3. The schools in the sample were tending to emphasize a multiplicity of purposes, with relative intensive effort being exerted to attain only a few purposes, and with a consequent tendency to emphasize a number of purposes somewhat superficially. Schools varied extensively not only in mean operational scores among purposes, but, also, within each purpose, with regard to the relative amount of effort being exerted to attain the purpose. The data also denoted that when the mean operational scores were partialled to determine the relative contribution of scores at each of the three levels of activity, the greatest contribution of the total score came from operational activity at Level A followed by Level B.

4. The data indicated that the schools in the sample were tending to emphasize the purposes in the random order as related to the order in which the purposes were scored and ranked by Jury II. The regression coefficient was not significantly greater than zero, and only .25 per cent of the variation around the regression line was attributable to regression.

5. The data indicate that the schools were tending to emphasize the purposes in the order in which they were scored and ranked by school raters, in terms of acceptance as goals in the industrial education programs of the schools, to the extent that the regression coefficient was significantly larger than zero, and that 64 per cent of the variation around the regression line was attributable to regression. Thus, the operations of the schools were directed more forcibly to attaining the purposes in the order in which they were scored and ranked by the school raters for acceptance than in the order in which they were scored and ranked by the jury for importance, and this trend was statistically significant. (The hypothesis that the true difference between $\sqrt{.0025}$, or .05 and $\sqrt{.64}$, or .80 -- the product moment correlation coefficients

between the mean operational scores and (1) the purpose scores assigned by Jury II for importance and (2) the purpose scores assigned by the school raters for acceptance, respectively -- was zero was rejected at the .1 per cent level of significance.

6. When schools were grouped according to selected classifications for five variables -- size of school, program offerings, type of industrial education program offered, geographical location, and assessed valuation per enrolled pupil -- it was found, generally, that only the variables (1) of whether the schools offered trade and industrial education programs in addition to industrial arts, and (2) of whether teachers were assigned part- or full-time to trade and industrial education consistently and significantly accounted for variations in the operational scores. Schools offering trade and industrial education programs in addition to industrial arts received higher operational scores for twenty-two of the twenty-three purposes. And the teachers who were assigned part- or full-time to trade and industrial education also received higher operational scores for twenty-two of the twenty-three purposes than did the teachers assigned to teach industrial arts only. Size of school also was found to be a variable related to variation in operational scores, with the large-size schools, generally, receiving higher scores than the two smaller size groups. There was reason to believe, however, that the large schools received higher scores not because size itself was contributing to the variation but because the large schools were more likely to offer specialized programs of industrial education, and were emphasizing more intensively the purposes related to adult education. The variables (1) of whether schools offered both industrial education and vocational agriculture or industrial education only, geographical location in state, and (3) assessed valuation per enrolled pupil were not identified as being related significantly to variations in mean operational scores.

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CHAPTER XII

PROGRAM OPERATIONS IN INDUSTRIAL EDUCATION AS MEASURED BY OPERATIONAL AGGREGATES AND COMPARED WITH RESOURCE VARIABLES

It previously was stated that the operational aggregate for educational program represents a quantitative description of the program when the nature of operational emphasis and effort is affected by the value of the purposes for which particular operations apply. For the purpose of this study, operational aggregates were determined for programs of industrial education in a 75 school sample.[1]

Chapter XII reports and summarizes the findings involving operational aggregates for 75 programs of industrial education. After briefly discussing the nature of the operational aggregate as a measure of program operations, major attention is given to testing the relationship between variations in the operational aggregate measures for instructional programs and variations in selected community, school, organization, and resource variables for the schools included in the study.[2]

I. THE STATUS OF INDUSTRIAL EDUCATION BASED ON OPERATIONAL AGGREGATES

Based on the purpose-process concept underlying the bidimensional approach to educational appraisal, data were obtained from which operational aggregates were calculated for instructors and programs of industrial education in the 75 school sample.

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[1] See supra, pp. 131-136; J.K. Coster, N.J. Nelson, and F.J. Woerdehoff, A Bidimensional Approach to Education Appraisal (Lafayette, Indiana: Purdue University, Division of Education), 1960.

[2] The specific objectives of the project treated in Chapter XII, as were listed in Chapter I, are:

(8). To obtain for each teacher and each school in the sample a quantitative measure of the operational effort and emphasis put forth to attain the purposes of industrial education, modified in terms of the relative importance of the particular purpose.

(9). To ascertain the relationship between operational effort and emphasis put forth to attain purposes, modified in terms of the relative importance of the purpose, and (1) selected school and community variables, and (2) selected material and human resource variables.

Industrial education was broadly conceived to include programs identified as industrial arts as well as those identified as trade and industrial. A breakdown of the sample shows that the programs in 56 schools were of the industrial arts type only and the programs in 19 schools included certain trade and industrial courses in addition to industrial arts courses. Although later treatment of data distinguishes between programs classed as industrial arts only and those classed as industrial arts plus trade and industrial, this distinction was not a factor in the initial determination of operation aggregates for school programs in industrial education.

To obtain operational aggregates for industrial education programs, purpose factors were needed which served to influence operations to the extent the factor for each purpose varied in value. Table XII-1 shows the purpose scores with the corresponding purpose factors placed in rank order for twenty-three purposes of industrial education.[3] It may be noted that the purpose ranked first had a purpose factor arbitrarily set at 100 for the purpose score of 679. Corresponding values for the other twenty-two purposes were obtained by substituting the various purpose scores into the equation 679:100:: (Purpose Score) : X. Thus, Purpose No. 7 ranked twenty-third had a purpose score of 451 which produced an X value of 66. The value 66 became the purpose factor for the 23rd ranked purpose.

Data obtained through the observational-interview were used to obtain operational scores for each purpose of industrial education. For each of the twenty-three purposes, the operational score was multiplied by the purpose factor to determine the operational factor. Then the twenty-three operational factors were again multiplied by the appropriate purpose factor resulting in a purpose-operation cross product. This procedure was introduced primarily to increase dispersion which had the affect of favoring programs where important purposes were being emphasized. The sum of the purpose-operation cross products for a given instructional program in each school became what is termed an operational aggregate. The position of a school on the operational aggregate contimuum was taken as a relative indication of the social adaptability of the program, inasmuch as the social data derived from Part I of the study were introduced both in determining the operational factor and the purpose factor.

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[3] Cf. Table X-1, supra, p. 154.

TABLE XII - 1

PURPOSE FACTORS AND PURPOSE SCORES FOR TWENTY-THREE PURPOSES OF INDUSTRIAL EDUCATION ARRANGED IN RANK ORDER

Purpose			
Rank	Number	Score	Factor
1	6	679	100
2	12	669	99
3	8	633	93
4	9	632	93
5	11	624	92
6	10	621	91
7	20	613	90
8	19	594	87
9	14	585	86
10	2	580	85
11	21	568	84
12	13	567	84
13	1	561	83
14	22	560	82
15	5	557	82
16	17	552	81
17	23	546	80
18	18	539	79
19	16	526	77
20	4	504	74
21	15	494	73
22	3	493	73
23	7	451	66

Table XII-2 reports the distribution of operational aggregates and the corresponding T-scores arranged in rank order for the 75 programs of industrial education. With the standard T-score mean of 50 and a standard deviation of 10, it was determined that 67 per cent of the scores fell within ±1 deviation from the mean. Approximately 95 per cent of the operational aggregates fell within ±2 standard deviations from the mean. The mean operational aggregate when N=75, was determined to be 570.57. The median for the ranked distribution was found to be 580. In that the mean and median are very close, the scores approximate a normal distribution. However, with the mean slightly larger than the median, there was slight skewness toward the low end, or the skewness was slightly negative.

It should be recognized that the operational aggregate is a relative measure calculated to classify schools for purposes of comparison. This being true, there were no established scores or intervals which became the standard measures for classifying programs. However, variations in the measure among programs does indicate that programs with the larger operational aggregates are functioning at higher levels in terms of operational emphasis and effort than certain other programs which have correspondingly lower operational aggregates within the context of this appraisal technique.

It may be observed from the data found in Table XII-2 that operational aggregates for the 75 programs of industrial education ranged from a high of 918 to a low of 214. Although, theoretically a program operating at maximum capacity for each of the twenty-three purposes could receive an operational aggregate of 1642, it would be highly unlikely that a program in actuality could achieve the maximum measure. As a relative measure, the operational aggregate does provide a gauge for making comparisons among programs but not to be considered an evaluation against a predetermined standard. In this regard, the program of industrial education which had an operational aggregate of 214 and ranked lowest, it could be judged, was not operating at a high level nor emphasizing important purposes by comparison with other programs. The program which ranked highest, with an operational aggregate of 918, it could be surmised on the other hand, was apparently emphasizing important purposes and operating at reasonably high levels for many purposes. Between these extremes, and in relation to measures of central tendency, corresponding judgments could be made based on the size of the operational aggregates for the remaining 73 programs of industrial education. One fact evident from the operational aggregates reported in Table XII-2 is the great variability in operational emphasis and effort as measured by operational aggregates for the 75 programs of industrial education studied.

TABLE XII - 2

SCHOOLS ARRANGED IN RANK ORDER ACCORDING TO OPERATIONAL AGGREGATES AND T SCORES FOR SEVENTY-FIVE PROGRAMS OF INDUSTRIAL EDUCATION

Rank of school	Operational aggregate	T Score	Rank of school	Operational aggregate	T Score
1	918	74.18	38	580	50.66
2	828	67.91	39	578	50.52
3	792	65.41	40	571	50.04
4	781	64.64	41	570	49.96
5.5	746	63.59	42	569	49.89
5.5	746	63.59	43.5	554	48.85
7	740	61.79	43.5	554	48.85
8	738	61.65	45	550	48.57
9	732	61.23	46	543	48.08
10	731	61.16	47	535	47.53
11	730	61.09	48	534	47.46
12	729	61.02	49	517	46.28
13	726	60.81	50	515	46.13
14	705	59.35	51	508	45.65
15	702	59.14	52	507	45.58
16.5	701	59.07	53.5	506	45.51
16.5	701	59.07	53.5	506	45.51
18	697	58.80	55	504	45.37
19	693	58.52	56	497	44.88
20	685	57.96	57	494	44.68
21.5	659	56.15	58	490	44.39
21.5	659	56.15	59	454	41.89
23	651	55.60	60	450	41.61
24	650	55.53	61	449	41.54
25	637	54.62	62	437	40.71
26	633	54.34	63	431	40.29
27	632	54.27	64	426	39.94
28	626	53.86	65	399	38.06
29	616	53.16	66	387	37.23
30	614	53.02	67	372	36.18
31	612	52.88	68	369	35.98
32	605	52.40	69	354	34.93
33.5	599	51.98	70	338	33.82
33.5	599	51.98	71	324	32.84
35	589	51.28	72	322	32.71
36.5	582	51.49	73	266	28.81
36.5	582	51.49	74	253	27.91
			75	214	25.19

Median - 580.00
Mean - 570.57
s - 143.73

II. THE RELATIONSHIP BETWEEN COMMUNITY VARIABLES AND OPERATIONAL AGGREGATES FOR PROGRAMS OF INDUSTRIAL EDUCATION

It was stated previously in Chapter VI, which discussed the relationship between selected variables and operational aggregates for vocational agriculture, that community variables are being identified as cause and effect factors accounting for differences among educational operations and programs. Just as it was important to investigate whether community variables were related to program operations in agriculture, it is important to make comparable investigations for industrial education. Community variables, such as size of school, geographic location, population characteristics, and financial resources, were used to establish groups of schools for testing whether said socio-economic variables were related to differences in operational aggregates for programs of industrial education.

Relationship of School Size to Operational Aggregates

Size for the sake of size in educational structure does not make a reasonable argument. If, however, it can be determined that size contributes to such educational necessities as breadth of educational offerings, quality of instruction, or increased operating efficiency, then arguments for larger schools are strengthened immeasurably.

Table XII-3 summarizes the results of statistical tests applied to study the relationship between school size and operational aggregates. The data show that the hypothesis that the true difference between the mean operational aggregates of the small, medium, and large schools was zero was rejected at the 1 per cent level of significance, when tested by the single classification analysis of variance. When, however, hypotheses were formulated to the effect that (1) the difference between the mean operational aggregates for the three size groups for industrial arts only (N = 56) was zero, and (2) the difference between the mean operational aggregates for the two size groups in which trade and industrial education was offered in addition to industrial arts (N = 19) was zero were tested, the attending hypothesis was not rejected in either instance.

The results of analyzing the differences between means for the two groups of schools separately suggested the possibility that size, in itself, may not account for variability in operational aggregates. To pursue this possibility, a null hypothesis was formulated to the effect that the true difference between the mean operational aggregates of schools offering industrial arts only and schools offering both programs was zero. This hypothesis was rejected at the .1 per cent level. Hence, it may be concluded that schools that offer both programs were superior in social adaptability, as measured by the operational aggregate, to schools that limited offerings in industrial education to industrial arts.

TABLE XII-3

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE THE RELATIONSHIP BETWEEN SIZE OF SCHOOLS AND TYPE OF PROGRAMS IN SCHOOLS OFFERING INDUSTRIAL EDUCATION PROGRAMS AND OPERATIONAL AGGREGATES

Size group	Total sample		Both programs		Industrial Arts only					
					All schools		With Vo.Ag.		Without Vo.Ag.	
	N	Means	N	Means	N	Means	N	Means	N	Means
Small	21	516.14	0		21	516.14	11	527.09	10	504.10
Medium	26	528.38	4	652.00	22	505.91	12	492.92	10	521.50
Large	28	650.57	15	693.53	13	601.00	3	658.33	10	583.80
		P < .01		P > .05		P > .05				
Total	75	570.57	19	684.79	56	531.82	26	526.46	30	536.47
				P < .001						

Analysis of Variance for School Size and Type of Program

Small-middle		4	43		
		652.00	510.91		
Large		15	13		
		693.53	601.00		
Source of variation	df	Sum of squares	Mean square	F	Hypothesis
Size of school	1	41565.57	41565.57	2.66	P > .05
Number of programs	1	130942.36	130942.36	8.37	P < .01
Size x Number	1	5645.65	5645.65	.36	P > .05
Within sub-groups	71	1110293.37	15637.93		

Analysis of Variance for School Size and Curricular Offerings for Industrial Arts Schools only

Source of variation	df	Sum of squares	Mean square	F	Hypothesis
Size of school	2	91981.03	45590.52	2.43	P > .05
Curricular offerings	1	5445.88	5445.88	.29	P > .05
Size x Offerings	2	4282.88	2291.44	.12	P > .05
Within sub-groups	50	937377.50	18747.55		

The hypotheses pertaining to size when all schools are considered, and pertaining to whether schools offer one or both programs of industrial education having been rejected, whereas the hypotheses pertaining to size for specific program offerings having not be n rejected, further tests were made in an effort to trace variation to its sources. Tests were made by double classification analysis of variance. In view of the fact that none of the small schools offered trade and industrial education, but that the difference between the mean operational aggregates of the small and middle-size schools offering industrial arts only was small and not statistically significant, the small and middle-size schools were combined into a single group of 43 schools with a mean of 510.91. The results of the analyses of main effects and interaction are shown in Table XII-3. The hypothesis that the difference attributable to the effect of size was zero was not rejected. The hypothesis that the difference attributable to the effect of whether one or both programs were offered was zero was rejected at the 1 per cent level of significance. Interaction was found to be absent.[4]

The results of the foregoing tests support a conclusion that size alone did not account for variation in quality of programs as measured by the operational aggregate, but that size of school made possible the introduction of trade and industrial education into the school structure, which did result in an increment in quality of instruction. Additional tests between means were made of the data in the 2 x 2 design, with the following results.

1. The hypothesis that there was no difference between the means of the two size groups offering industrial arts only (510.91 and 601.00) was not rejected.

2. The hypothesis that there was no difference between the means of the two size groups offering both programs (652.00 and 693.54) was not rejected.

3. The hypothesis that there was no difference between the means within the small- and middle sized schools (510.91 and 652.00) was not rejected.

4. The hypothesis that there was no difference between the means within the large-size schools (601.00 and 693.53) was not rejected.

5. The hypothesis that there was no difference between the means of the small-middle schools offering industrial arts only (510.91) and the large schools offering both programs (693.53) was rejected at the .1 per cent level of significance.[5]

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[4] The model for the 2 x 2 and 2 x 3 analysis of variance designs, with unequal n, is found in G.W. Snedecor, Statistical Methods (Fourth edition; Ames, Iowa: The Iowa State College Press, 1946), pp. 284-93.

The above results show no marked trends, with one exception. The difference between the means for the large schools was less than the difference between the means of the small and middle-size schools. Further, the difference between the means of the large schools offering both programs and the large schools offering industrial arts only was not statistically significant, whereas the difference between the means of the large schools offering both programs and the combined small and middle-size schools offering industrial arts only was statistically significant. One possible explanation for this observation is that many of the large schools offering industrial arts actually were operating programs which were quite similar to the trade and industrial programs, but which did not meet the technical requirements for trade and industrial education, and, hence, were classified as industrial arts. Moreover, the large schools are more likely to offer specialized programs in industrial arts, and the results of analyses presented in subsequent sections of this chapter consistently point to the superiority of spcialized programs.

Table XII-3 also summarizes data and reports results of statistical tests which were included to determine whether having or not having vocational agriculture in schools was related to variations in operational aggregates for industrial education. The tests were limited to the 56 schools offering industrial arts only. A 2 x 3 analysis of variance design was used for these tests. The hypothesis that the true difference between the mean operational aggregates of schools offering and not offering vocational agriculture was zero was not rejected. The hypothesis that the true difference between the means of schools in the three size groups was zero likewise was not rejected. Interaction was found to be absent. The finding that having or not having vocational agriculture had little bearing on the operational aggregates for industrial arts programs is somewhat corollary to the finding reported in Chapter VI in which it was shown that presence or absence of industrial arts programs was not identified as a variable related to variations in the operational measure for vocational agriculture.

Relationship of Geographic Location to Operational Aggregates

To determine whether the general geographic location of school systems within the state was a community variable related to operational aggregates for programs of industrial education, the 75 schools were distributed into either (1) the North, (2) the North Central, (3) the South Central, or (4) the South group, according to location, and appropriate tests then were made. It may be observed in Part A of Table XII-4 that the three null hypotheses tested to the effect that there was no difference in mean operational aggregates between geographic location groups (1) of the 56 schools offering industrial

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5 H. Scheffe, "A Method for Judging All Contrasts in the Analysis of Variance," Biometrika, 40:87-104, June, 1953.

TABLE XII - 4

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN LOCATION IN STATE (PART A) AND RURAL-URBAN CLASSIFICATION OF STUDENT BODY (PART B) OF SCHOOLS OFFERING INDUSTRIAL EDUCATION AND MEAN OPERATIONAL AGGREGATES

PART A
Location in State

Type of program	North N	North Means	North Central N	North Central Means	South Central N	South Central Means	South N	South Means	P
Schools offering industrial arts only (n = 56; $\bar{X}$ = 531.82)	20	554.50	12	528.92	15	510.67	9	520.56	NS
Schools offering both industrial arts and trade and industrial education (n = 19; $\bar{X}$ = 684.79)	6	661.17	3	695.67	6	647.17	4	761.75	NS
All schools (n = 75; $\bar{X}$ = 570.57)	26	579.12	15	562.27	21	549.67	13	596.85	NS

Chi-square test of independency of frequency distribution - $P > .05$

PART B
Population Groupings

Type of program	Highly rural N	Highly rural Means	Half rural, half urban N	Half rural, half urban Means	Highly urban N	Highly urban Means	Completely urban N	Completely urban Means	P
Schools offering industrial arts only (n = 56; $\bar{X}$ = 531.32)	14	529.36	25	521.36	14	536.64	3	608.00	NS
Schools offering both industrial arts and trade and industrial education (n = 19; $\bar{X}$ = 684.79)	0	--	6	747.33	11	659.64	2	635.50	NS
All schools (n = 75; $\bar{X}$ = 570.57)	14	529.36	31	565.10	25	590.76	5	619.00	NS

Chi-square test of independency of frequency distribution - $P < .02$

arts only, (2) of the 19 schools offering trade and industrial classes plus industrial arts, and (3) of the 75 programs of industrial education were all found to stand. Thus, from the tenability of the hypotheses it can be defended that geographic location of schools in Indiana did not appear to have a major bearing on the size of operational aggregates for industrial education programs.

Another test was made with the data reported in Part A of Table XII-4 using the chi square procedure to determine whether the null hypothesis to the effect the proportions of schools offering either industrial arts only or industrial arts plus trade and industrial programs were not dependent on geographic location of schools. The result of the test as reported in Part A of Table XII-4, shows the hypothesis to be tenable. Thus, it could be defended that geographic location was not a factor found to be related to the type of program classification, that is, whether industrial arts only or industrial arts plus trade and industrial education.

Relationship of Rural-Urban Student Classification to Operational Aggregates

A third socio-economic variable studied for the purpose of checking the relationship to school operations in industrial education was the rural-urban complexion of the high school student body of the 75 schools included in the study. These data are summarized in Part B of Table XII-4. It may be noted in the probability column (P) of the table that several null hypotheses were tested to the effect that there was no difference in operational aggregates for programs among schools with a student body that was (1) highly rural, (2) partly rural and partly urban, (3) highly urban, or (4) completely urban. Each of the three null hypotheses tested was found to be tenable. It could be defended that the rural urban classification of a high school student body was not found to be an important variable in the pattern of operations for either industrial arts programs only or for programs offering both industrial arts and trade and industrial education.

The chi-square test of independency of the distribution of schools reported in Part B of Table XII-4 showed a definite relationship between the type of programs offered and the rural-urban classification of the high school student body. The null hypothesis that the type of programs offered in industrial education were not dependent on the rural-urban complexion of the student body was rejected at the 2 per cent level of significance. Observation of the data shows that

the more rural the student body the more likely it was that industrial arts programs only will be offered in the schools. On the other hand, trade and industrial type programs tended to be found in a proportionally greater number of schools enrolling a proportionally greater number of pupils classified as urban.

Relationship of Financial Resources to Operational Aggregates

Financial resources available to and usable by school districts become economic variables which discriminate among communities. The financial ability of a community to support the costs of education often is identified as a condition pre-requisite to providing desirable education. Local autonomy in education makes possible the exercise of considerable latitude in the tax effort a community may make to go beyond minimum state requirements to support education. Thus, financial effort discriminates among communities as a measure of endeavor to support the costs of education. This sub-section considers the relationship of selected measures of financial ability and effort to the level of program operations in industrial education as measured by the operational aggregate for these programs.

Financial ability related to operational aggregates. Financial ability may be considered the financial potential to secure funds based on measures of capacity. For purposes of this study the financial ability measure was determined by dividing the number of pupils enrolled in grades 1 through 12 in a school system into the total assessed valuation of the system to secure the assessed valuation per pupil enrolled. Three groupings based on this measure were determined and the 75 schools offering industrial education programs were distributed according to the appropriate grouping of assessed valuation per enrolled pupil. The frequency distribution of schools and their corresponding operational aggregate measure became the quantitative data used to test pertinent ability-operation hypotheses and ability-type program hypotheses. Applicable data are summarized and results of statistical tests are reported in Table XII-5.

Three null hypotheses were formulated to test whether operational aggregates for schools offering (1) programs of industrial arts, (2) programs of both industrial arts and trade and industrial education, and (3) industrial education program without regard to type, were independent of financial ability. The single analysis of variance procedure was used to obtain F values, which, with the appropriate degrees of freedom, were used to find the probabilities to determine whether the hypotheses would stand or would be rejected. It may be observed from the probability (P) column of Table VII-5, that the hypotheses were found to be tenable at the 5 per cent level of significance. Thus, it could be defended that financial ability as measured by the assessed valuation per pupil was not a variable highly related to program operations in industrial education.

TABLE XII - 5

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN FINANCIAL ABILITY TO SUPPORT EDUCATION FOR TWO TYPES OF INDUSTRIAL EDUCATION AND MEAN OPERATIONAL AGGREGATES

Type of program	Assessed Valuation Per Enrolled Pupil: Less than $6000.00 N	Means	$6000.00-8999.99 N	Means	$9000.00 and over N	Means	P
Schools offering industrial arts only (n = 56)	15	501.60	21	546.10	20	539.50	NS
Schools offering both industrial arts and trade and industrial education (n = 19)	4	646.00	10	686.40	5	712.60	NS
All schools (n = 75)	19	532.00	31	591.35	25	574.12	NS

Chi-square test of independency of frequency distribution - $P > .05$

TABLE XII - 6

RESULTS OF TESTS OF SIGNIFICANCE TO DETERMINE RELATIONSHIP BETWEEN MEDIAN SALARIES OF TEACHERS AS A MEASURE OF FINANCIAL EFFORT OF SCHOOLS, AND MEAN OPERATIONAL AGGREGATES FOR SEVENTY-FIVE SCHOOLS OFFERING INDUSTRIAL EDUCATION PROGRAMS

ITEMS	Median Salaries of Teachers Groups: $4500- Under	$4501- 5000	$5001- 5500	$5501- Over	P
Number of Schools	24	14	16	21	
Means	514.8	520.6	593.4	650.2	.01

To ascertain whether statistical evidence would support the null hypothesis that the proportion of schools offering industrial arts only or industrial arts plus trade and industrial education was independent of financial ability, the chi-square test of independency of the frequency distribution was performed. It was found, as reported in Table XII-5, that $P \geq .05$. The hypothesis tested was tenable at the chosen level. It could be argued that financial ability was not a significant economic variable, highly related to the type of industrial education program organization found in the schools included in the sample.

Financial effort related to operational aggregates. Whereas financial ability is a measure of potential, financial effort is a measure of exertion. No evidence was disclosed in the preceding subsection to warrant suppport of the position that financial ability was highly related to the operational levels of industrial education programs as determined by the operational aggregate measure. However, a somewhat more complete picture of the financial dimension would be presented if the effort variable were analyzed. Thus, to determine whether financial effort was a variable highly related to industrial education program operations, the null hypothesis to the effect that there was no difference in operational aggregates of industrial education programs among the four financial effort groups was tested. Again the single classification analysis of variance procedure was utilized to make the test. Table XII-6 summarizes basic data used to perform the statistical calculations and reports the result of the test of significance.

For purposes of this test, the assumption was made that median salaries of teachers in each of the 75 schools in the sample could serve as a gauge indicative of financial effort made by the community to support education. Teacher salaries represent the single, largest operating expenditure for education, and, furthermore school officials have, but with few legal restrictions, considerable freedom to establish the salary scales for teachers. Then, too, the use of salary schedules and the prevailing practice of not discriminating among teachers because of the nature of their teaching assignments tended to establish further the reasonableness of the assumption. As shown in Table XII-6, the 75 schools were distributed into one of four financial effort groups determined by differences in median salaries.

The hypothesis which related operational aggregates to financial effort as measured by median salaries was rejected at the 1 per cent level of significance. Rejection of the hypothesis presented statistical evidence to warrant taking the position that financial effort, as used in this study, was an economic variable highly related to the operation of industrial education programs. Observation of the means

of operational aggregates shows a consistent pattern of ascent--the mean of the operational aggregates rises as the level of financial effort increases.

The apparent relationship between operations of industrial education programs and financial effort demonstrated how effort was an economic variable identified with variations in program operations. However, it was reasoned that effort, considered independently of ability, introduced a bias. That is, school districts with high financial ability who paid high salaries to teachers were not making the correspondingly real effort that was made by school districts with low ability who paid high salaries to teachers. For this reason, further analyses were made of the relationship of financial effort to program operations when difference in financial ability were accounted for in the treatment of the problem.

Financial ability-effort relationship to operational aggregates. After carefully studying the financial data available for the 75 schools in the sample, ability-effort groupings were determined, which it was reasoned, qualified effort in relation to ability. Convenient breaking points for financial ability were arbitrarily determined, after reviewing the state pattern, to be a middle group, with the range of assessed valuation per pupil being between $6,000.00 and $8,999.00; with the low group consisting of schools with less than $6,000.00 in ability and the high group of schools with $9,000.00 and over by the selected measure of ability. Within each of the ability groups, schools were ranked according to financial effort. In addition to median salaries of teachers, school tax rates for operations were analyzed. These data tended to satisfy the conditions needed within each ability group for indicating differences in effort. By arbitrarily selecting a breaking point, near the measure of central tendency that was most discriminating, schools were classed as either high effort or low effort schools within each of the three financial ability groups.

Table XII-7 and XII-8 show the operational aggregate for each of the schools within the respective ability-effort groups arranged in rank order. These data were used to test a series of null-hypotheses for (1) the 75 schools in the sample that offered programs of industrial education, and (2) the 56 schools of the 75 that offered industrial arts programs only. The single classification analysis of variance was the statistical technique used to perform calculations to determine F values, which, with appropriate degrees of freedom, were used to find the probabilities at the selected levels of significance.

TABLE XII-7

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN THE FINANCIAL EFFORT EXERTED BY SCHOOL DISTRICTS TO SUPPORT PROGRAMS OF INDUSTRIAL EDUCATION (INCLUDING TRADE AND INDUSTRIAL EDUCATION) AND MEAN OPERATIONAL AGGREGATES WHEN SCHOOLS ARE GROUPED ACCORDING TO FINANCIAL ABILITY TO SUPPORT EDUCATION

Operational Aggregates of Schools in Six Financial Ability-Effort Groupings					
Assessed Valuation Per Resident Pupil					
Less than $6000.00		$6000.00 to 8999.00		$9000.00 or over	
Low effort	High effort	Low effort	High effort	Low effort	High effort
729	746	730	918	828	792
701	580	705	781	632	738
697	578	685	746	569	726
626	571	605	740	554	702
599	506	554	732	508	693
543	431	534	731	504	659
490	354	517	701	497	659
450		515	650	454	651
426		507	637	437	599
387		494	633	369	589
372		399	616	324	570
322		266	614	214	550
		253	612		535
		338	582		
			582		
			506		
			449		
Sums 6342	3766	7102	11230	5890	8463
N 12	7	14	17	12	13
Means 528.50	538.00	507.29	660.58	490.83	651.00

Tests of significance:

Among six ability-effort groups - - - - - - d.f. = 5, 69 ... $P < .01$

Between three low-effort groups and three high-effort groups- - - - - - - d.f. = 1, 73 ... $P < .001$

Mean of 38 low-effort schools- - - - - - - - - 508.79
Mean of 37 high-effort schools - - - - - - - - 634.03

TABLE XII-8

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN THE FINANCIAL EFFORT EXERTED BY SCHOOL DISTRICTS TO SUPPORT PROGRAMS OF INDUSTRIAL ARTS AND MEAN OPERATIONAL AGGREGATES WHEN SCHOOLS ARE GROUPED ACCORDING TO FINANCIAL ABILITY TO SUPPORT EDUCATION

Operational Aggregates of Schools in Six Financial Ability-Effort Groupings					
Assessed Valuation Per Resident Pupil					
Less than $6000.00		$6000.00 to 8999.00		$9000.00 or over	
Low effort	High effort	Low effort	High effort	Low effort	High effort
701	746	705	781	632	792
626	571	685	746	554	693
599	506	605	732	508	659
543	431	554	637	504	659
490	354	534	633	497	651
450		517	612	454	599
426		515	506	437	589
387		507	449	369	570
372		494		324	550
322		399		214	535
		338			
		266			
		253			
Sums 4916	2608	6372	5096	4493	6297
N 10	5	13	8	10	10
Means 491.60	521.60	490.15	637.00	449.30	629.70

Tests of significance:

Among six ability-effort groups - - - - - - d.f. = 5, 50 ... $P < .01$

Between three low-effort groups
and three high-effort groups- - - - - - - d.f. = 1, 54 ... $P < .001$

Mean of 33 low-effort schools - - - - - - - - - 478.21
Mean of 23 high-effort schools- - - - - - - - - 608.74

A series of four null hypotheses were tested, two each for the 75 operational aggregates and two each for the 56 operational aggregates for industrial arts only programs. The results of the tests reported in Tables XII-7 and XII-8 reveal that all four null hypotheses were rejected at the 5 per cent, or greater, level of significance. Thus, when considering industrial education programs without regard to type or when considering programs classified as industrial arts only, it was found that a significant variation in operational aggregates was disclosed (1) among the six ability-effort groups, and (2) between the mean of the high effort schools and the mean of the low effort schools.

When reviewing the operational aggregates and the means of the operational aggregates for each of the sub-groups several interesting conditions become evident. First, in no instance was the operational aggregate mean of low effort schools, regardless of ability, as high as the mean of the three high effort sub-groups. Secondly, no clear cut consistent pattern occurs that would suggest a definite tie between ability and effort indicating a direct relationship. Thirdly, within the low effort sub-group there were cases where programs were accorded high operational aggregates, and, conversely, within the high effort sub-groups there were cases where programs were accorded low operational aggregates. Thus, it may be reasoned that other intervening variables were present in certain cases which may have contributed to this measure, and, in part, offset the financial ability and financial effort variables.

The statistical analyses made thus far that related operational aggregates for industrial education programs to measures of financial ability and financial effort tended to identify variations among operational aggregates to variations in financial ability and in financial effort. However, unanswered are questions concerning differential effects of ability and effort, and further, whether the interaction of ability and effort produces an additive property. To provide further insight into the relationship between operational aggregates and the two financial resource variables, ability and effort, when these variables are considered simultaneously, additional statistical tests of the pertinent data were made.

Interrelationships of financial ability-effort to operational aggregates. For the purpose of answering questions to determine whether financial ability or financial effort tends to contribute most to variations in operational aggregates, and to ascertain whether ability and effort tend to operate independently as economic variables associated with differences in operational aggregates, the double classification analysis of variance statistical procedure was employed to test pertinent hypotheses. Tables XII-9 and XII-10

TABLE XII-9

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP AMONG OPERATIONAL AGGREGATES FOR PROGRAMS OF INDUSTRIAL EDUCATION AND THE FINANCIAL ABILITY, AND THE FINANCIAL EFFORT TO SUPPORT THESE PROGRAMS

Operations of Industrial Education Programs

Financial Ability	Financial Effort: High Effort	Financial Effort: Low Effort	Average Means
High	651.00	490.88	570.92
Medium	660.59	507.29	583.94
Low	538.00	528.50	533.25
Average Means	616.53	508.87	

Source of Variance*	df	Sum of Squares	Mean Squares	F	P
Effort	1	201891	201891	12.16	.001
Ability	2	29352	14676	.88	NS
Interaction	2	72547	36274	2.18	NS
Error	69	1145840	16606		

*Statistical treatment: Double classification analysis of variance.

TABLE XII-10

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP AMONG OPERATIONAL AGGREGATES FOR PROGRAMS OF INDUSTRIAL ARTS AND THE FINANCIAL ABILITY, AND THE FINANCIAL EFFORT TO SUPPORT THESE PROGRAMS

Operations of Industrial Arts Programs

Financial Ability	Financial Effort: High Effort	Financial Effort: Low Effort	Average Means
High	629.70	449.30	539.50
Medium	637.00	490.15	563.58
Low	521.60	491.60	506.60
Average Means	596.10	477.02	

Source of Variance*	df	Sum of Squares	Mean Squares	F	P
Effort	1	181812	181812	12.15	.01
Ability	2	25892	12946	.87	NS
Interaction	2	47440	23720	1.59	NS
Error	50	747899	14958		

*Statistical treatment: Double classification analysis of variance.

summarize findings and report the results of the statistical tests.

Where the single criterion of classification was used to calculate the values needed to establish statistically a relationship between operational measure of industrial education programs and (1) financial ability or (2) financial effort, the interpretations from these results are restricted to identification of the significant relationship. For the purposes of ascertaining whether the inner workings of financial ability and financial effort acted on each other and to trace the variation to its source to estimat comparable effectiveness of ability and effort, several null hypotheses were formulated and tested. First, the hypothesis that there was no interaction between financial ability and financial effort was tested. Secondly, the hypothesis was tested to the effect that there was no difference in operational aggregates among the three financial ability groups. Finally, the hypothesis to the effect that there was no difference in operational aggregates between the two financial effort groups was tested. These tests were made for the 75 school sample which included all industrial education programs, as reported in Table XII-9 and for the 56 school sample of industrial arts only programs, as reported in Table XII-10.

In that the two hypotheses tested for interaction were not rejected because their interaction value was not found to be in either case significantly greater than zero, financial ability was not found to be a function of financial effort and vice versa. Thus, under the conditions of this study, financial ability and financial effort relate independently of each other to operational aggregates for industrial education programs generally and for industrial arts programs only.

When the hypotheses were tested to the effect that operational aggregates for programs of industrial education programs generally, or for industrial arts programs only, were not different among the the three financial ability groups, the F values were not great enough to cause rejection of the hypothesis in either case. Hence, it may be inferred that financial ability, when studied simultaneously with financial effort to identify differential effects, was not a financial resource variable that was a major source of variation among operational aggregates. However, when the comparable hypotheses were tested for financial effort they were found untenable, and thus rejected in both cases. From these results, as reported in Tables XII-9 and XII-10, it may be concluded that the source of major variation between operational aggregates for programs of industrial education generally or for industrial arts only when related to financial ability and financial effort was due to financial effort.

III. THE RELATIONSHIP BETWEEN SCHOOL ORGANIZATION VARIABLES AND OPERATIONAL AGGREGATES FOR PROGRAMS OF INDUSTRIAL EDUCATION

Organization refers to the way parts are arranged to work together. When considering educational organization, a paramount concern should be to plan the arrangement that best satisfies the conditions necessary for effective and efficient operation. For purposes of this study, it was determined important to identify a selected number of school organization variables to use in making statistical analyses to ascertain whether evidence could be found that identified levels of program operations in industrial education with certain variables in school organization. This section of the chapter relates operational aggregates of industrial education programs to such school organization variables as (1) administrative organization for vocational education, (2) membership in the North Central Association of Colleges and Secondary Schools, (3) personnel structure for guidance, and (4) organization patterns for teaching.

Administrative Organization for Vocational Education Related to Operational Aggregates

Although the high school principal continues to be accountable for the educational activities in the school administered by him, the administrative and supervising function associated with vocational education oftimes is delegated to a vocational director. On the supposition that the employment of a special administrator for vocational education might be a school organization variable associated with the level of program operations in industrial education, operational aggregates were related to variations in administrative-supervisory organization of industrial education. Pertinent data and results of tests of significance are summarized in Table XII-11.

When the analysis of variance statistical procedure was employed to ascertain whether the difference in operational aggregates between the 24 schools that employed vocational directors and the 49 schools where no special directors were employed was a chance difference, the null hypothesis being tested was rejected at the .1 per cent level of significance. Thus, it may be concluded that in fewer than one out of each 1000 cases could this difference have occurred by chance. Observation of the means of the operational aggregates, as reported in Table XII-11 shows the mean of 643.86 for schools with vocational directors to be considerably larger than the mean of 526.18 for the schools in the sample that did not employ vocational directors.

Interestingly, additional tests made with these data when the same statistical procedure was employed to test two similar hypotheses for (1) the schools that offered industrial arts only and (2) the schools offering both industrial arts and trade and industrial education

TABLE XII-11

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN TYPES OF SUPERVISORY ASSISTANCE AVAILABLE TO INDUSTRIAL EDUCATION TEACHERS FOR TWO TYPES OF INDUSTRIAL EDUCATION PROGRAMS, AND MEAN OPERATIONAL AGGREGATES

Type of program	Supervisory Classification: Principal and/or general supervisor N	Means	Principal and/or general supervisor and vocational director N	Means	P
Schools offering industrial arts only (n=54)	44	510.23	10	584.60	NS
Schools offering both industrial arts and trade and industrial education (n=19)	5	666.60	14	691.29	NS
All schools (n=73)	49	526.18	24	643.86	.001

Chi-square test of independency of frequency distribution - $P < .001$

Analysis of Variance based on Four Sub-groups

Source of variation	df	Sum of squares	Mean square	F	Hypothesis
Between sub-groups	3	410677.16	136892.38	8.96	Rejected
Within sub-groups	69	1054064.19	15276.29	--	$P < .001$
Total	72	1464741.35			

Analysis of Main Effects and Interaction

Source of variation	df	Sum of squares	Mean square	F	Hypothesis
Type of program	1	175566.09	175566.09	11.49	$P < .01$
Supervisory structure	1	24895.94	24895.94	1.63	$P > .05$
Type x Structure	1	6261.69	6261.69	.41	$P > .05$
Within Sub-groups	69	1054064.19	15276.29		

did not disclose differences great enough to cause rejection of the hypotheses. These test results suggest that the nature of the program offering within the field of industrial education is in itself an intervening school organization variable which influences the pattern of results. Accordingly, additional tests of significance were made with a double classification analysis of variance technique, and the results of these tests are shown also in Table XII-11. The difference between means attributable to the variable of whether schools offered industrial arts only or trade and industrial education programs in addition to industrial arts was significant at the 1 per cent level. The difference between means attributable to supervisory structure, however, was not significant, nor was interaction found to be significant. Thus, the differences between the means of schools in which vocational directors were employed was traced to the type of programs offered by the schools, rather than to the addition of specialized supervisory personnel.

It should be pointed out, however, that there was a significantly greater liklihood that schools offering both programs had the services of a vocational director, and this fact indirectly may account for the higher scores received by schools offering both programs. Whereas only 18.5 per cent of the schools offering industrial arts only employed a vocational director, nearly three fourths (73.7 per cent) of the schools offering both programs did so. The hypothesis that the proportion of schools employing a vocational director was independent of program offerings was rejected at the .1 per cent level of significance. The results of this chi-square test, reported in Table XII-11, of course, does not identify cause-effect, but it does establish a high relationship between schools organized administratively to employ a vocational director and the program structure for industrial education programs which include trade and industrial education in addition to industrial arts.

Membership in North Central Association Related to Operational Aggregates

Many schools, interested in appraising efforts, have requested the North Central Association of Colleges and Secondary Schools to undertake a study which, if the school satisfactorily meets the criteria, results in membership in the association indicating accreditation by this agency. Membership in the North Central Association was selected as a school organization variable to be related to program operations, as measured by the operational aggretate of industrial education programs. Several null hypotheses were formulated and tested to the effect that operational aggregates for (1) schools offering industrial arts only, (2) schools offering both industrial arts and trade and industrial education, and (3) schools offering industrial education work generally were not different from schools that were or were not affiliated with the North Central Association. Table XII-12 shows the

means of the operational aggregates and reports the results of the tests of significance.

TABLE XII-12

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN WHETHER SCHOOLS ARE MEMBERS OF NORTH CENTRAL CONFERENCE OF COLLEGES AND SECONDARY SCHOOLS FOR TWO TYPES OF INDUSTRIAL EDUCATION PROGRAMS AND MEAN OPERATIONAL AGGREGATES

Type of program	Membership in Association				
	Yes		No		
	N	Means	N	Means	P
Schools offering industrial arts only (n=56)	33	544.15	23	514.13	NS
Schools offering both industrial arts and trade and industrial education (n = 19)	18	682.33	1	729.00	NS
All schools (n = 75)	51	592.92	24	523.08	NS

Chi-square test of independency of frequency distribution - $P < .01$

The observed differences were not great enough to cause rejection of the hypotheses. The tenability of the hypotheses suggests that North Central membership was not a school organization variable highly related to operational aggregates for the various classifications of industrial education programs tested with the data.

An additional null hypothesis tested to the effect that the proportion of schools offering industrial arts only and the proportion of schools offering both industrial arts and trade and industrial education was independent of North Central membership was rejected at the 1 per cent level of significance. Observation of the data shows that, although the majority of schools in each program classification were affiliated with the North Central Association, the proportion was much greater for the schools offering both industrial arts and trade and industrial education.

Personnel Structure for Guidance Related to Operational Aggregates

In that several of the important purposes of industrial education programs implied a need for guidance activities as the operational means for attaining the purposes, the personnel structure for guidance in the schools in the sample was selected as a school organization variable for study. To ascertain whether the overall operational measure for industrial education programs was related to the extent to which special guidance personnel were available in the schools, hypotheses were set up to the effect that there was no difference between mean operational aggregates for three guidance personnel groups, including (1) the group of schools in which no special guidance person was employed, (2) the group of schools in which one person was assigned part-time to guidance, and (3) the group of schools in which one or more persons were assigned full-time to guidance. The hypotheses were tested by analysis of variance. The pertinent data are summarized and the test results are reported in Table XII-13.

The hypothesis that there was no difference between the mean operational aggregates for the three guidance personnel groups for the total sample of 75 schools was rejected at the 5 per cent level of significance. This finding indicates that a relationship does exist between operational aggregates and personnel structure for guidance. Observation of the data shows that the operational aggregates means increase as the extent of employment of specialized guidance personnel increases. When, however, the hypotheses pertaining to the two sub-groups were tested, the results indicated that the hypotheses were not rejected. Hence, the findings relative to specialized guidance personnel were similar to the findings relative to specialized administrative personnel for vocational education. This condition again points to the fact that differences due to the extensiveness of program offerings in industrial education may have been an intervening variable which influenced the test results. This possibility was explored by applying a two-way analysis of variance test. The tests of significance, the results of which are shown in the lower portion of Table XII-13, are based on the means shown in the upper part of this table. The hypothesis that the true difference between means attributable to whether one or two programs of industrial education were offered was zero was rejected at the 1 per cent level of significance. The hypothesis that the true difference between means attributable to the guidance personnel group was zero was not rejected. Interaction was not found to be present.

The latter analysis suggests that the difference between means of schools in the total sample, grouped according to extensiveness of assigned guidance personnel, tended to be attributable to the fact that schools offering trade and industrial education in addition to

TABLE XII-13

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN EXTENT OF SPECIALIZED GUIDANCE PERSONNEL EMPLOYED FOR TWO TYPES OF INDUSTRIAL EDUCATION PROGRAMS, AND MEAN OPERATIONAL AGGREGATES

Type of program	Assigned Guidance Personnel: None N	None Means	Part-Time N	Part-Time Means	Full-Time N	Full-Time Means	P
Schools offering industrial arts to only (n=55)	17	499.65	25	521.00	13	581.38	NS
Schools offering both industrial arts and trade and industrial education (n=19)	1	580.00	4	753.25	14	672.71	NS
All schools (n=74)	18	504.11	29	553.03	27	628.74	.05

Chi-square test of independency of frequency distribution - $P < .001$

Analysis of Variance Based on Six Sub-groups

Source of variation	df	Sum of squares	Mean square	F	Hypothesis
Between sub-groups	5	663493.82	132698.76	10.65	Rejected
Within sub-groups	68	846911.81	12454.59	---	$P < .001$
Total	73	1510405.63			

Analysis of Main Effects and Interaction

Source of variation	df	Sum of squares	Mean square	F	Hypothesis
Type of program	1	105748.92	105748.92	8.49	$P < .01$
Guidance personnel	2	29286.20	14163.10	1.18	$P > .05$
Type x personnel	2	48277.57	24138.79	1.94	$P > .05$
Error	68	846911.81	12454.59		

industrial arts were more likely to employ full-time or part-time guidance personnel than schools offering industrial arts only. When frequency distributions of schools in each category were compared, by using the chi-square test of independency in contingency tables to test the null hypothesis that the proportion of schools classified into two groups by virtue of the nature of the program offerings was independent of the three personnel structure groups, the hypothesis was rejected at the .1 per cent level of significance. It may be observed from the frequency distribution of schools reported in Table XII-13 that a higher proportion of schools, 73.7 per cent, offering both industrial arts and trade and industrial education than schools offering industrial arts only, 17.3 per cent, have available full-time guidance personnel.

Organization Patterns for Teaching Related to Operational Aggregates

On the thesis that such things are (1) the number of teachers employed, (2) the size of classes, (3) the pupil contacts per teaching day, (4) the number of periods taught, (5) the teaching assignment, and (6) the subject areas taught were school organization variables that may be related to the operation of industrial education programs, these elements of the teaching environment were selected for study. Tables XII-14 through XII-19, which follow, summarize pertinent data and report results of tests of significance applied to determine the relationship of organizational patterns for teaching to operational aggregates for the programs of industrial education included in the study.

Number of teachers related to operational aggregates. Of the 75 schools included in the sample the number of teachers ranged between one teacher devoting part-time to work in industrial education to ten teachers devoting full-time to industrial education instruction. Four groups were determined based on number of teachers assigned teaching duties in industrial education. The schools were distributed into one of these groups depending on whether 1,2,3 or 4, or 5 or more teachers were instructing in the field of industrial education. Comparisons were then made to ascertain whether a relationship existed between the number of teachers of industrial education subjects and the operational aggregates of the schools. Table XII-14 shows the frequency distribution of schools according to teacher groups, reports the means operational aggregates according to program classification and teacher group, and reports the results of tests of significance.

Rejection of the null hypothesis, at the .1 per cent level when tested by the analysis of variance procedure, to the effect that there was no difference between number of teachers employed groups and operational aggregates for programs of industrial education established that variability not attributable to chance in operations

XII-14

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN NUMBER OF INDUSTRIAL EDUCATION TEACHERS EMPLOYED IN SCHOOLS FOR TWO TYPES OF INDUSTRIAL EDUCATION PROGRAMS AND MEAN OPERATIONAL AGGREGATES

Type of program	Number of Teachers Employed								
	1		2		3 - 4		5 or more		
	N	Means	N	Means	N	Means	N	Means	P
Schools offering industrial arts only (n = 56)	33	508.30	12	538.42	5	571.60	6	614.83	NS
Schools offering both industrial arts and trade and industrial education (n = 19)	1	729.00	0	0	4	632.25	14	696.64	NS
All schools (n = 75)	34	514.79	12	538.42	9	598.56	20	672.10	.001

Chi-square test of independench of frequency distribution - P<.001

based on number of teachers employed existed. It may be observed that the means of operational aggregates ascend in order from a low of 514.79 for the one teacher group to a high of 672.10 for the 5 or more teacher group. However, when two comparable hypotheses were tested by breaking down the population of industrial education schools to sub-populations of schools offering industrial arts only and schools offering both industrial arts and trade and industrial education, the test results indicated that these hypotheses were tenable. Although one may conclude that a high relationship existed between operations of industrial education program and the number of instructors, it must be recognized that the classification of programs again appeared to be a variable whose contributing effects were not controlled by the application of the single classification analysis of variance.

The application of the chi-square test of the frequency distribution to the 2 x 4 contingency table established by the two groupings of program classifications and the four number of teachers employed groups revealed that differences not due to chance were evident. It is reported in Table XII-14 that the hypothesis

tested to the effect that the proportion of schools within the four groups based on number of teachers employed was independent of the two program classification groups was rejected at the .1 per cent level of significance. The data clearly indicate that programs classified as industrial arts are found in a high proportion of schools with two or fewer teachers, whereas programs offering both industrial arts and trade and industrial education are found in high proportion of schools with three or more teachers.

Class size related to operational aggregates. Table XII-15 summarizes pertinent data and reports results of tests of significance that related operational aggregates for industrial education teachers to average class size. Four null hypotheses were tested to the effect that there was no difference in operational aggregates of instructors for the four average class size groups. Separate tests were run for industrial arts teachers, trade and industrial education teachers, teachers who taught in both fields, and all teachers in the sample. All the hypotheses were tenable. Thus, no evidence was disclosed to indicate a high relationship existed between operational aggregates and the size of the average class for the four categories considered.

An interesting condition was noted in the mean-class size group pattern. For the classification including industrial arts teachers only, the lowest operation mean was found with the smallest class size group, and in order, as the class size group got large so did the mean. For the combination teachers and trade and industrial education teachers only, the reverse pattern prevails, that is, as the class size group got larger the means got smaller. The small classes in industrial arts were more prevalent in the small and medium classification of schools than in the large schools. In that the operational aggregate mean for the small and medium schools was smaller than for the large schools, this fact may be a partial explanation of the pattern of association between the means of operational aggregates as related to number of teachers and program classification evident from the data reported in Table XII-15.

Using the frequency distribution of teachers who were compartmentalized according to teacher classificatin and average class size group, the chi-square test of independency in contingency tables was performed to ascertain whether class size was related to teacher classification. The null hypothesis that the proportion of teachers in the four class size groups was independent of the three classification categories was rejected at the .1 per cent level of significance, thus, signifying a definite relationship not due to chance. A study of the frequency distribution reported in Table XII-15 shows that 42 per cent and 51 per cent respectively of the industrial arts only and the combination teachers had classes averaging 21 or more pupils as compared with trade and industrial instruction where only 13 per cent of the teachers had classes averaging 21 or more pupils in size.

TABLE XII-15

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN AVERAGE NUMBER OF PUPIL CONTACTS PER PERIOD FOR INDUSTRIAL EDUCATION TEACHERS AND MEAN OPERATIONAL AGGREGATES

	Average Number of Pupil Contacts Per Period								
	Less than 16 pupils		16 - 20 pupils		21 - 25 pupils		26 or more pupils		
Classification of teacher	N	Means	N	Means	N	Means	N	Means	P
Teaching industrial arts only ($n=126$; $\bar{X} = 559.48$)	25	538.12	49	551.35	41	558.17	11	649.09	NS
Teaching both industrial arts and trade and industrial education ($n = 35$; $\bar{X} = 699.74$)	6	746.83	11	722.36	11	713.91	7	601.57	NS
Teaching trade and industrial education only ($n = 23$; $\bar{X} = 877.74$)	12	889.08	8	910.00	2	798.00	1	643.00	NS
All teachers ($n = 184$; $\bar{X} = 625.94$)	43	665.19	68	621.21	54	598.78	19	631.26	NS

Chi-square test of independency of frequency distribution P- <.01

Pupil contacts related to operational aggregates. A second teacher load variable used as a school organization variable to determine relationship to operational aggregates of instructors was pupil contacts. By pupil contacts was meant the total number of pupils per day per instructor in all classes. Table XII-16 shows the frequency distribution of teachers and means of the instructors' operational aggregates distributed according to teacher classification categories and pupil contact groups and reports the results of tests of significance.

The null hypotheses tested by the analysis of variance procedure to the effect that there was no difference in operational aggregates among the four pupil contact groups were not rejected for the teachers classified as the industrial arts only group or for the both industrial arts and trade and industrial education groups. However, the hypotheses were rejected at the 1 per cent level of significance for the

TABLE XII - 16

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN TOTAL PUPIL CONTACTS PER DAY FOR INDUSTRIAL EDUCATION TEACHERS AND MEAN OPERATIONAL AGGREGATES

Classification of teacher	Less than 41 pupils		41 - 80 pupils		81 - 120 pupils		121 or more pupils		P
	N	Means	N	Means	N	Means	N	Means	
Teaching industrial arts only ($n = 126$; $\bar{X} = 559.48$)	1	734.00	17	565.82	46	559.98	62	554.55	NS
Teaching both industrial arts and trade and industrial education ($n = 35$; $\bar{X} = 699.74$)	2	787.50	11	728.82	8	735.25	14	644.07	NS
Teaching trade and industrial education only ($n = 23$; $\bar{X} = 877.74$)	12	939.17	5	916.20	2	775.00	4	696.75	.01
All teachers ($n = 184$; $\bar{X} = 625.94$)	15	905.27	33	673.24	56	592.70	80	577.33	.001

Chi-square test of independency of frequency distribution P - <.001

teachers classified as the trade and industrial education only group and at the .1 per cent level for the all teachers group. Although statistical evidence would not warrant concluding that pupil contacts was a factor identified with operational levels of industrial arts or combination industrial arts and trade and industrial teachers, the evidence did show a high relationship between operational levels and pupil contacts for teachers of trade and industrial subjects. Observation of the means in each compartment of the table shows that the pattern for all classifications of teachers was similar. In this regard, the highest operational measures were associated with the lowest pupil contact group (less than 41 pupils) and the lowest operational measures were associated with the highest pupil contact group (121 or more pupils). This fact explains in part why the null hypothesis that included all teachers as the population was rejected whereas two of the three hypotheses tested for the sub-populations were found tenable.

It also should be noted that the number of pupil contacts was an element in the organizational patterns for teaching found to be dependent on assignment classification. When the chi-square test of independency of that frequency distribution was applied to the data reported in Table XII-16 the hypothesis being tested was rejected at the .1 per cent level of significance. Thus, it could be concluded that the proportion of teachers in the four pupil contact groups was not independent of teacher classification. Whereas, one out of every two industrial arts teachers were assigned classes totaling 121 or more pupil contacts per day, this was true of only one out of every eight trade and industrial education teachers. This finding raises the question, although not tracing cause-effect, of whether the previously established difference in operational levels that favored the trade and industrial education instructor over the industrial arts instructor may not have been influenced by the pupil contact variations.

Number of periods taught related to operational aggregates. The teaching load, measured by number of periods taught, is sometimes identified as a condition that influences teacher performance. In this regard, one position is taken that as teaching load increases, teaching effectiveness decreases. To ascertain if a relationship was evident that identified differences in operational aggregates of industrial education instructors with variations in teaching load based on number of periods taught a series of hypotheses were tested. Distributions were made on the basis of instructor classification according to the nature of the teaching assignment. Table XII-17 shows the number of instructors in each of the number of period groups and in each of the classification of teacher groups, along with the mean operational aggregate of the group, and reports results of statistical tests of significance.

The analysis of variance test applied to the data to ascertain whether operational aggregates were different among the three number of periods taught groups of industrial education instructors when considered (1) for industrial arts teachers only, (2) for combination teachers, (3) for trade and industrial teachers only, and (4) for all teachers considered as one population. The four null hypotheses, tested for each teacher classification group, that there was no difference in the operational aggregates of industrial education instructors of three number of periods taught groups were found to be tenable at the accepted level of significance. Thus, no evidence was found to establish that a high relationship existed between operational aggregates of industrial education instructors and the number of classes taught by the instructors. Observation of the data shows that differences in the means of operational aggregates were greater when viewed vertically according to classification of teacher groups than when viewed horizontally for the number of periods taught groups.

TABLE XII-17

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN NUMBER OF PERIODS ASSIGNED PER DAY FOR INDUSTRIAL EDUCATION TEACHERS AND MEAN OPERATIONAL AGGREGATES FOR THREE CLASSES OF TEACHERS

	Number of Periods						
	Less than 4 periods		5 periods		6 or more periods		
Classification of teacher	N	Means	N	Means	N	Means	P
Teaching industrial arts only (n = 126; X = 559.48)	32	572.75	46	570.20	48	540.35	NS
Teaching both industrial arts and trade and industrial education (n = 35; X = 699.74)	1	713.00	16	700.19	18	698.61	NS
Teaching trade and industrial education only (n = 23; $\bar{X}$ = 877.74)	5	880.80	1	811.00	17	880.76	NS
All teachers (n = 184; $\bar{X}$ = 625.94)	38	616.97	63	607.03	83	644.40	NS

Chi-square test of independency of frequency distribution - $P < .001$

Although differences in the number of periods taught was not found to be a variable associated with differences in operational aggregates of industrial education teachers, regardless of classification, there was a high relationship evident between the classification of teachers and the number of periods taught. The results of the chi-square test, as reported in Table XII-17 caused rejection of the null hypothesis that the proportion of teachers in each of the number of periods taught groups was independent of the classification of teachers. It may be observed that more instructors in each classification teach six or more periods than teach either five periods or four or fewer periods. However, whereas 74 per cent of the instructors of trade and industrial education only teach six periods, only 40 per cent of the industrial arts teachers and 51 per cent of the instructors who teach in both fields were found to be teaching six or more periods. It should be noted that the typical trade and industrial instructors had a

single class which meets for three consecutive periods whereas the industrial arts teacher would have a different class each period.

Teaching assignment related to operational aggregate. Within the pattern of organization for teaching, it was observed by the research staff that variation in aggregates existed with regard to subjects and grade levels taught. These observations are highlighted in Table XII-18. The single classification analysis of variance was used to test the hypotheses that (1) operational aggregates were independent of whether the teachers (a) taught full-time in trade and industrial education, (b) taught part-time in trade and industrial education, or (c) did not teach trade and industrial education programs; and (2) operational aggregates for industrial arts only teachers were independent of whether the teachers (a) taught industrial arts only in grades 9 through 12, (b) taught industrial arts and other subjects in grades 9 through 12, or (c) taught industrial arts only in grades 7 through 12.[6] Both hypotheses were rejected at the .1 per cent level of significance. These results, based on operational aggregates computed for individual teachers, rather than on operational aggregates computed for schools,[7] demonstrated that the specific assignment of the teacher was a variable related significantly to variation in operational aggregates.

Inspection of the data, however, prompted the question of whether the means of sub-groups varied significantly in each instance. To answer this question, a single classification analysis of variance was set up, using five sub-groups; A,B,C-1, C-2, and C-3. Then a test for differences between pairs of means only, with unequal n_i, was applied to test differences between pairs of means.[8] The results of the tests are shown also in Table XII-18. The mean for the trade and industrial education only teachers was significantly higher than any other single mean, and the means for the two sub-groups of industrial arts teachers who did not teach full-time in industrial arts in the senior high school were, individually, significantly lower than the other three means, also taken individually. But the difference between the means of the full-time industrial arts teachers who taught in the senior high schools only, and the part time trade and industrial education teachers was not significant. These results show that as the teaching assignment of the industrial

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6 This test was limited to the 126 industrial arts only teachers for whom data as to specific assignments were available.

7 Cf. supra, pp. 281-285.

8 H. Scheffe, "A Method for Judging All Contrasts in the Analysis of Variance," Biometrika, 40:87-104, June, 1953.

TABLE XII - 18

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN TEACHING ASSIGNMENTS OF INDUSTRIAL EDUCATION TEACHERS AND MEAN OPERATIONAL AGGREGATES

Sub-group	Teaching assignment	N	Means	P
A	Teaching trade and industrial education only	23	877.74	
B	Teaching both trade and industrial education and industrial arts	41	698.15	
C	Teaching industrial arts only	132	558.20	.001
C-1	Teaching industrial arts only, grades 9-12	61	618.75	
C-2	Teaching industrial arts and other subjects, grades 9-12	42	513.04	
C-3	Teaching industrial arts only, grades 7-12	23	487.04	.001

Results of Tests of Significance Between Pairs of Means

	877.74	698.15	618.75	513.05	487.04
877.74		.001	.001	.001	.001
698.15			NS	.001	.001
618.75				.01	.01
513.05					NS
487.04					

arts teachers became more specialized, the means increased significantly, although there was a significant difference between the mean of full-time industrial arts and teachers and the mean of full-time trade and industrial education teachers.

Subject area related to operational aggregates. A final school organization variable selected for study related subject area taught to operational aggregates of the instructors. Pertinent data used when applying the analysis of variance procedure to test hypotheses are summarized and the results of tests of significance are reported in Table XII-19. The relationship of operational aggregates to subject areas was investigated specifically for instructors of general shop, woodworking and building trades, drafting, machine shop, and printing. A sixth subject area category, called "other," included content areas such as electricity, electronics and sheet metal which were found to be offered in too few schools to make separate categories. Two series of null hypotheses were tested--one series being that there was no difference in operational aggregates for the respective subject areas of the four teacher classification groups, and the other being there was no difference in operational aggregates for the respective classification of teachers of the six subject area groups. Because all general shop instructors were classified as teachers of industrial arts, comparisons between teacher classification and operational aggregates could not be made for this subject area group.

The results of the tests of significance which related operational aggregates to teacher classification caused rejection of the null hypotheses tested at the 5 per cent, or greater, level of significance for the four special subject areas investigated. Only in the case of the 'other' category were the differences not found to be great enough to warrant concluding that the differences were not due to chance. Observation of the data reported in Table XII-19 shows that a uniform pattern prevailed with the operational aggregate means being lowest for the industrial arts teacher classification (Column A) and highest for the trade and industrial education teacher classification (Column C). The combination teacher classification (Column B) had means falling between those of the other two groups. These findings broaden the basis for generalization by establishing that not only did operational levels in industrial education highly relate to teacher classification but was true for such specific subjects within the broad field as woodworking and building trades, drafting, machine shop, and printing. It should be noted that the tenability of the hypothesis of the 'other' group may have been affected by the within variations of the several subjects areas included in this category. For example, several instructors of electronics had received high operation values as measure by the operational aggregate. However, the relatively low operational values associated

TABLE XII - 19

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN SUBJECT AREA OF INDUSTRIAL EDUCATION TEACHERS AND MEAN OPERATIONAL AGGREGATES FOR THREE CLASSIFICATIONS OF TEACHERS

Subject area	Classification of Teacher A N	A Means	B N	B Means	C N	C Means	P	All teachers N	All teachers Means
General shop	56	525.43	0	--	0	--	--	56	525.43
Woodworking, building trades	26	518.81	3	776.00	0	--	.05	29	545.41
Drafting	19	572.26	7	687.86	1	1036.00	.05	27	608.41
Machine shop	13	606.08	14	675.79	9	853.33	.01	36	696.25
Printing	7	599.99	7	733.43	3	963.33	.01	17	718.65
Other	11	711.27	10	718.30	10	853.70	NS	31	759.48
Results of tests of significance	P <.01		P >.05		P >.05			P <.001	
All teachers	132	558.20	41	698.15	23	877.74	.001	196	624.97

Classification:
A - Teaching industrial arts only
B - Teaching both industrial arts and trade and industrial education
C - Teaching trade and industrial education only

with the instruction in one of the other isolated subject areas had leveled out the means of this group which had the effect of reducing variation among the classification groups.

In addition to establishing the extent of relationship between operational aggregates of instructors based on teacher classification and subject area, the data were analyzed to ascertain whether major differences existed among subject areas. Null hypotheses to the effect that there was no difference in operational aggregates of the six subject area groups where considered for industrial education teachers generally or for the three special teacher classification groups were tested. The tests of significance applied specifically to combination industrial arts and trade and industrial teachers (Column B) and trade and industrial education teachers only (Column C) did not result in differences great enough to cause rejection of these hypotheses. Thus, no evidence was disclosed that the variation in operational aggregates in the respective subject areas for combination on trade and industrial education instructors were not chance differences. However, the similar null hypothesis for the industrial arts teacher only group (Column A) was rejected at the one per cent level of significance. The statistical evidence thus presented indicated that the variations noted for industrial arts teachers could have occurred by chance in not more than one case out of each 100 cases. With the exception of the woodworking subject area, the operational aggregate means were larger for industrial arts instructors who were in situations organized on the unit shop basis and teaching special subjects. It may be observed that the mean was highest for the "other" subject area group. The two special areas within the "other" group for industrial arts programs were electricity and electronics. A reasonable deduction that can be made from the additional insight presented by these findings is that operational aggregates for school programs of industrial arts were influenced considerably by general shop and woodworking subjects on one hand and special subject offerings in electricity and electronics on the other hand. Whereas, general shop and woodworking tended to pull the measure of operations down, course work in electricity and electronics tended to raise the measure of operations of industrial arts programs. In a more general sense, and with the exception of woodworking, special unit offerings were associated with higher levels of operations than were general shop offerings.

IV. THE RELATIONSHIP BETWEEN RESOURCES AND OPERATIONAL AGGREGATES FOR PROGRAMS OF INDUSTRIAL EDUCATION

Educational emphasis and effort directed to attain program goals is contingent on the available means provided to implement the educational process. Educational resources become the means through which the educational function is implemented. Resources may be

broadly categorized as being material or human in nature. The teaching station, instructional equipment, and teaching materials are included as the common material resources associated with educational programs. The teachers, whose training, experience, energy, imagination, and other talents are employed to guide and direct learning activities, become the principal human resource of education. Of course, other administrative and supervisory personnel and special service personnel often are provided to oversee performance, to coordinate activities, to counsel, to relieve the teacher of duties and assignments that take away from instructional effort or of duties the teacher is not adequately equipped to perform, and to serve otherwise the instructional task. Although, admittedly resources available and applicable for the task are essential for translating educational purposes into program operation, there is uncertainty concerning the variety and nature of resources that are related to operational emphasis and effort. This section of the chapter identifies the relationship that was found to exist between operational aggregates for instructional programs of industrial education and educational resources selected for appraisal.

Relationship of Material Resources to Operational Aggregates

The material resources selected for study were divided into five categories to include (1) facilities, (2) equipment, (3) teaching materials, (4) auxiliary services, and (5) special service resources. Within each category two or more specific kinds of resources were included. Resources had been appraised by the research staff as to adequacy except for the category classified as special service resources that had been appraised as to use. The rating categories were used to establish appropriate column groupings to provide frequency distributions of schools and to provide groupings of operational aggregates for school programs. Classification of schools on the basis of type of programs being either industrial arts only or both industrial arts and trade and industrial education provided sub-population groupings for purposes of statistical analyses.

The analysis of variance procedure was utilized to test the relationship between resources and program operations. In these instances, the extent of adequacy or extent of use ratings assigned resources were associated with operational aggregates of industrial education programs to test a series of null hypotheses to the effect that there was no difference in operational aggregates between the different rating categories of resources. A second series of tests were made using the chi-square test of independency in contingency tables. In these instances, the null hypotheses were tested to the effect that the proportion of schools receiving various ratings of resources was independent of type of program. The tables that

follow summarize pertinent data relevant to the tests of significance and reports results of these tests.

Adequacy of classroom and shop facilities and equipment related to operational aggregates. Pertinent data are summarized and results of tests of significance reported in the next five tables with regard to the relationship between adequacy ratings of classroom and shop facilities and equipment and operational aggregates of industrial education programs and between adequacy ratings of these resources and program classification.

The tenability of the null hypotheses tested to the effect that there was no difference in operational aggregates between the four adequacy ratings categories[9] of classroom facilities for (1) programs of industrial arts only and (2) both industrial arts and trade and industrial education as shown in Table XII-20 indicate that the variances noted were probably chance differences. However, when the same hypothesis was tested for all schools (N=75), differences were such to cause rejection of the hypothesis at the 5 per cent level of significance. In that the results were different between the total population test for the 75 schools and the sub-population tests for the 56 industrial arts only and for the 19 combination program schools, the findings suggest that between differences may have been greater than within differences. Observation of the means of the operational aggregates tend to substantiate this deduction. Then, too, when the chi-square procedure was used to test whether the proportion of schools receiving adequacy ratings in the various categories was independent of the type of program, the hypothesis was rejected at the 2 per cent level. Whereas, for example, 71.4 per cent of the schools offering industrial arts only received one of the two inadequacy ratings, 95 per cent of the schools offering industrial arts and trade industrial education received these ratings. Of course, most evident is the fact that relatively few schools had provided class room space for industrial education considered as being adequate.

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[9] Ratings assigned on Form 10, Appraisal of Resources: Industrial Education (infra, pp. A-50 to A-56), assigned during visits to schools, were consolidated and placed on Form 10A (infra, pp. A-57 to A-59). The ratings assigned on Form 10A ranged from 1 to 7, with a rating of "1" indicating that the resource was judged "inadequate," and a rating of "7" denoting a "very adequate" resource. In the tables that follow, ratings from 1 to 3 are considered "inadequate," a rating of 4 is considered "somewhat inadequate," a rating of 5 "somewhat adequate," and ratings of 6 or 7 are considered "very adequate."

TABLE XII - 20

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN ADEQUACY OF CLASSROOM FACILITIES FOR TWO TYPES OF INDUSTRIAL EDUCATION PROGRAMS AND MEAN OPERATINAL AGGREGATES

Type of program	Adequacy of Classroom Facilities: Inadequate N	Inadequate Means	Somewhat inadequate N	Somewhat inadequate Means	Somewhat adequate N	Somewhat adequate Means	Very adequate N	Very adequate Means	P
Schools offering industrial arts only (n = 56)	31	499.90	9	586.33	8	545.25	8	580.70	NS
Schools offering both industrial arts and trade and industrial education (n = 19)	9	653.89	9	713.89	0	0	1	701.00	NS
All schools (n = 75)	40	534.55	18	650.11	8	545.25	9	594.11	.05

Chi-square test of independency of frequency distribution - $P \leq .05$

In contrast with the findings pertaining to classroom facilities, a high relationship was found to exist between operational aggregates and adequacy ratingsof shop facilities, regardless of the type program. The results of the tests of significance reported in Table XII-21 show that the three hypotheses tested were rejected at the 5 per cent, or greater level. Observation of the data shows a direct relationship existing between resource ratings for shops and operational aggregates--as the ratings increased so did the operational aggregates. It also should be noted that the proportion of schools receiving adequacy ratings for shop facilities did not varify significantly on the basis of type of program. Whereas 47.4 per cent of the industrial arts and trade and industrial education program schools received one of the adequacy ratings for shops, 39.3 per cent of the industrial arts only program schools received one or the other of the adequacy ratings for shop facilities.

TABLE XII-21

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN ADEQUACY OF SHOP FACILITIES FOR TWO TYPES OF INDUSTRIAL EDUCATION PROGRAMS AND MEAN OPERATIONAL AGGREGATES

Type of program	Adequacy of Shop Facilities								
	Inadequate		Somewhat inadequate		Somewhat adequate		Very adequate		
	N	Means	N	Means	N	Means	N	Means	P
Schools offering Industrial arts only (n = 56)	13	440.08	21	510.38	11	593.09	11	619.91	.01
Schools offering both industrial arts and trade and industrial education (n = 19)	1	582.00	9	646.44	5	748.60	4	717.00	.05
All schools (n = 75)	14	450.21	30	551.20	16	641.69	15	645.80	.001

Chi-square test of independency of frequency distribution - P>.05

The classroom equipment pattern for industrial education paralleled that of the classroom itself. Differences in operational aggregates among the programs categorized according to adequacy ratings of classroom equipment were not found to vary significantly when industrial arts only and combination programs were studied independently. However, as one population, and probably attributable to the effects of between variance when the sub-populations were combined, the differences were significant at the 5 per cent level. No evidence was disclosed to establish that the proportion of schools receiving the different adequacy ratings was dependent on program classification. What is most evident from the data summarized in Table XII-22 is the high proportion of all schools that received ratings indicating inadequacy of classroom equipment.

Shop equipment for industrial education was categorized as small tool and large tool equipment, and schools received independent ratings for each category. Test results and other pertinent data relating operational aggregates and type program to adequacy ratings

TABLE XII-22

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN ADEQUACY OF CLASSROOM EQUIPMENT FOR TWO TYPES OF INDUSTRIAL EDUCATION PROGRAMS AND MEAN OPERATIONAL AGGREGATES

Type of program	Adequacy of Classroom Equipment: Inadequate N	Inadequate Means	Somewhat inadequate N	Somewhat inadequate Means	Somewhat adequate N	Somewhat adequate Means	Very adequate N	Very adequate Means	P
School offering industrial arts only (n = 56)	33	494.67	15	570.07	5	619.00	3	604.00	NS
Schools offering both industrial arts and trade and industrial education (n = 19)	9	655.11	7	680.86	3	783.00	0		NS
All schools (n = 75)	42	529.05	22	605.32	8	680.50	3	604.00	.05

Chi-square test of independency of frequency distribution - P > .05

of small and large tool equipment are reported in Tablex XII-23 and XII-24. A study of these data and the test results reported present evidence to support the contention that the adequacy of shop tool equipment was very definitely related to operational aggregates of industrial education programs. Of the six null hypotheses tested to the effect that there was no difference in operational aggregates between adequacy ratings of small and of large shop tool equipment five were rejected at the one per cent, or greater, level of significance. Only in the case of small tool equipment, when the hypothesis was tested for the sub-population of schools offering both industrial arts and trade and industrial education, was the difference in operational aggregates not found to be great enough to cause rejection of the hypothesis. It may be observed in Table XII-23 that for 17 of the 19 schools offering the combination programs the small tool equipment was rated either somewhat adequate or very adequate. Thus, it may be concluded that small and large shop tool equipment, with the exception as noted, were material resources whose differences in adequacy ratings were highly related to program

TABLE XII - 23

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN ADEQUACY OF SMALL TOOL EQUIPMENT FOR TWO TYPES OF INDUSTRIAL EDUCATION PROGRAMS AND MEAN OPERATIONAL AGGREGATES

Type of program	Adequacy of Small Tool Equipment: Inadequate N	Inadequate Means	Somewhat inadequate N	Somewhat inadequate Means	Somewhat adequate N	Somewhat adequate Means	Very adequate N	Very adequate Means	P
Schools offering industrial arts only (n = 56)	9	424.89	19	495.63	19	591.63	9	588.89	.01
Schools offering both industrial arts and trade and industrial education (n = 19)	0		2	689.50	6	616.67	11	721.09	NS
All schools (n = 75)	9	424.89	21	514.10	25	597.64	20	661.60	.001

Chi-square test of independency of frequency distribution - $P < .01$

TABLE XII - 24

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN ADEQUACY OF LARGE TOOL EQUIPMENT FOR TWO TYPES OF INDUSTRIAL EDUCATION PROGRAMS AND MEAN OPERATIONAL AGGREGATES

Type of program	Adequacy of Large Tool Equipment: Inadequate N	Inadequate Means	Somewhat inadequate N	Somewhat inadequate Means	Somewhat adequate N	Somewhat adequate Means	Very adequate N	Very adequate Means	P
Schools offering industrial arts only (n = 56)	17	424.59	19	549.95	15	599.73	5	623.80	.001
Schools offering both industrial arts and trade and industrial education (n = 19)	0		5	638.20	7	640.00	7	762.86	.01
All schools (n = 75)	17	424.59	24	568.33	22	612.55	12	704.92	.001

Chi-square test of independency of frequency distribution - $P < .01$

operations in industrial education as measured by operational ag-aggregates. Observation of the operational aggregate means as reported in Tables XII-23 and XII-24 shows that a fairly consistent pattern is evident with low means identified with inadequate ratings and high means identified with adequate ratings.

It also was evident that the type of program in industrial education was a variable identified with adequacy of shop tool equipment. The chi-square test of the frequency distributions to ascertain whether adequacy ratings of shop tool equipment was independent of type of program resulted in rejection of the null hypotheses at the 1 per cent level. It should be noted, as can be seen from the frequency distribution of schools in Tables XII-23 and XII-24, that a higher proportion of industrial arts only schools received lower ratings than did the combination program schools.

Adequacy of teaching materials related to operational aggregates. Results of tests of significance applied to determine the relationship between the adequacy of such teaching materials as general and technical library references, audio-visual aids, and teaching outlines are reported in Tables XII-25 through XII-28. Using the single classification analysis of variance procedure to determine F values, a series of null hypotheses to the effect that there was no difference in operational aggregates among the various adequacy of teaching material groups were tested.

When the 75 schools offering programs of industrial education were considered as one population and distributed according to the extent of adequacy of four classifications of teaching materials the null hypothesis tested in each instance was rejected at the .1 per cent level of significance. Thus, it may be concluded that there was a difference in operational aggregates of industrial education programs among the adequacy groups (1) for general reference materials, (2) for technical reference materials, (3) for audio-visual aids, and (4) for teaching outlines. It may be observed from the data summarized in Tables XII-25 through XII-28 that a very definite pattern existed between adequacy ratings for resources and operational aggregates for programs. In this regard, the low means of operational aggregates were associated with the inadequate ratings of teaching materials, and, in order, as the ratings of resources were higher so were the means of the operational aggregates. When the 56 schools that offered programs in industrial arts only were treated separately, the comparable null hypotheses were all rejected at the 1 per cent, or greater, level, and the same pattern between resource ratings and means of operational aggregates prevailed. However, when the same series of tests were made for the 19 schools that offered trade and industrial education classes in addition to industrial arts classes, the four null hypotheses were found to be

TABLE XII - 25

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN ADEQUACY OF GENERAL REFERENCE MATERIALS FOR TWO TYPES OF INDUSTRIAL EDUCATION PROGRAMS AND MEAN OPERATIONAL AGGREGATES

Type of program	Adequacy of General Reference Materials: Inadequate #	Inadequate Means	Somewhat inadequate #	Somewhat inadequate Means	Somewhat adequate #	Somewhat adequate Means	Very adequate #	Very adequate Means	P
Schools offering industrial arts only (n = 56)	28	465.50	17	560.00	7	655.86	4	659.25	.001
Schools offering both industrial arts and trade and industrial education (n = 19)	2	597.00	5	663.80	7	692.29	5	730.40	NS
All schools (n = 75)	30	514.27	22	583.59	14	674.07	9	698.78	.001

Chi-square test of independency of frequency distribution - $P < .01$

TABLE XII - 26

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN ADEQUACY OF TECHNICAL REFERENCE MATERIALS FOR TWO TYPES OF INDUSTRIAL EDUCATION PROGRAMS AND MEAN OPERATIONAL AGGREGATES

Type of program	Adequacy of Technical Reference Materials: Inadequate #	Inadequate Means	Somewhat inadequate #	Somewhat inadequate Means	Somewhat adequate #	Somewhat adequate Means	Very adequate #	Very adequate Means	P
Schools offering industrial arts only (n = 56)	19	444.42	17	509.59	13	609.54	7	678.71	.001
Schools offering both industrial arts and trade and industrial education (n = 19)	0		3	603.33	12	690.58	4	728.50	NS
All schools (n = 75)	19	444.42	20	521.65	25	648.14	11	696.82	.001

Chi-square test of independency of frequency distribution - $P < .01$

TABLE XII - 27

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN ADEQUACY OF AUDIO-VISUAL AIDS FOR TWO TYPES OF INDUSTRIAL EDUCATION PROGRAMS AND MEAN OPERATIONAL AGGREGATES

Type of program	Adequacy of Audio-Visual Aids: Inadequate N	Mean	Somewhat inadequate N	Mean	Somewhat adequate N	Mean	Very adequate N	Mean	P
Schools offering industrial arts only (n = 56)	20	432.90	21	558.67	12	619.58	3	652.33	.001
Schools offering both industrial arts and trade and industrial education (n = 19)	1	580.00	3	705.33	13	683.69	2	713.50	NS
All schools (n = 75)	21	439.90	24	577.00	25	652.92	5	676.80	.001

Chi-square test of independency of frequency distribution - $P < .001$

TABLE XII - 28

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN ADEQUACY OF TEACHING OUTLINES FOR TWO TYPES OF INDUSTRIAL EDUCATION PROGRAMS AND MEAN OPERATIONAL AGGREGATES

Type of program	Adequacy of Teaching Outlines: Inadequate N	Mean	Somewhat inadequate N	Mean	Somewhat adequate N	Mean	Very adequate N	Mean	P
Schools offering industrial arts only (n = 56)	16	438.06	11	516.73	25	576.72	4	667.75	.01
Schools offering both industrial arts and trade and industrial education (n = 19)	0		3	644.67	9	651.78	7	744.43	NS
All schools (n = 75)	16	438.06	14	544.14	34	596.59	11	716.55	.001

Chi-square test of independency of frequency distribution - $P < .01$

tenable. Although, the pattern of relationship between resource ratings and operational aggregates was similar to that of the 75 school and 56 school groups, the differences were not found to be great enough to cause rejection of the hypotheses.

To determine whether adequacy ratings for teaching materials was independent of the type of program classification within the field of industrial education, the chi square test of independency of frequency distributions was used to test appropriate null hypotheses with the frequency data found in Tables XII-25 through XII-28. In each of the four distributions tested, the null hypothesis was rejected at the 1 per cent, or greater, level of significance. Therefore, evidence was disclosed to support the position that the proportion of schools in the various adequacy of teaching materials groups varied significantly according to program classification. It may be observed from the data reported in the tables that the proportion of schools receiving somewhat or very adequate ratings of general references, technical references, audio-visual aids, and teaching outlines was greater for the schools that offered both industrial arts and trade and industrial education than for the schools offering industrial arts only.

Adequacy of guidance services related to operational aggregates. To determine whether the availability and suitability of testing programs and counseling services for industrial education programs were related to the measures of program operations, adequacy ratings for guidance services were compared to operational aggregates. Tables XII-29 and XII-30 summarize the data and report results of tests of significance.

The null hypotheses tested to the effect that there was no difference in operational aggregates between (1) adequacy rating groups for testing programs and (2) adequacy rating groups for counseling services were both rejected at the 5 per cent level of significance for the 75 school population. Similar hypotheses tested for the sub-populations of 56 industrial arts only type programs and 19 combination programs were found to stand with one exception, the exception being the test that there was no difference in operational aggregates between the adequacy of testing programs groups for the 56 industrial arts only schools. In this instance, the hypothesis was rejected at the 5 per cent level. Observation of the data reported in Tables XII-29 and XII-30 suggests that where guidance services for industrial education were rated inadequate this condition tended to be reflected in low operational aggregates for industrial education programs. However, there was little variation among the means of operational aggregates for the somewhat inadequate, the somewhat adequate, and the very adequate guidance services groups. Furthermore, it would appear as if adequacy ratings for

TABLE XII - 29

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN ADEQUACY OF TESTING PROGRAMS FOR TWO TYPES OF INDUSTRIAL EDUCATION PROGRAMS AND MEAN OPERATIONAL AGGREGATES

Type of program	Adequacy of Testing Programs: Inadequate N	Inadequate Means	Somewhat inadequate N	Somewhat inadequate Means	Somewhat adequate N	Somewhat adequate Means	Very adequate N	Very adequate Means	P
Schools offering industrial arts only (n = 56)	26	469.88	4	572.50	23	584.52	3	610.33	.05
Schools offering both industrial arts and trade and industrial education (n = 19)	6	682.17	4	691.50	7	713.14	2	580.00	NS
All schools (n = 75)	32	509.69	8	632.00	30	634.53	5	598.20	.05

Chi-square test of independency of frequency distribution - $P > .05$

TABLE XII - 30

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN ADEQUACY OF COUNSELING SERVICES FOR TWO TYPES OF INDUSTRIAL EDUCATION PROGRAMS AND MEAN OPERATIONAL AGGREGATES

Type of program	Adequacy of Counseling Services: Inadequate N	Inadequate Means	Somewhat inadequate N	Somewhat inadequate Means	Somewhat adequate N	Somewhat adequate Means	Very adequate N	Very adequate Means	P
Schools offering industrial arts only (n = 56)	34	505.29	3	564.00	16	575.38	3	568.00	NS
Schools offering both industrial arts and trade and industrial education (n = 19)	6	663.33	9	691.89	3	692.67	1	726.00	NS
All schools (n = 75)	40	529.00	12	659.92	19	591.89	4	607.50	.05

Chi-square test of independency of frequency distribution - $P < .001$

guidance services had greater association to differences in operational aggregates for industrial arts only type programs than for schools where both industrial arts and trade and industrial education courses were offered.

To determine whether the type of program was a factor which tended to be associated with adequacy ratings of guidance services, the chi-square test of independency in contingency tables was performed using the frequency distribution of schools for the various rating categories. Two null hypotheses were tested to the effect that ratings of guidance services were independent of type of program classification. Whereas the null hypotheses concerning testing programs was found to be tenable, the one concerning counseling services was rejected at the .1 per cent level of significance. These findings denote that the proportion of schools of the industrial arts only group and the combination program group did not vary significantly in the distribution among the various rating categories of testing programs but did vary significantly among the various rating categories of counseling services. The data reported in Table XII-30 show that a higher proportion of schools offering both industrial arts and trade and industrial education (79 per cent) than schools offering industrial arts only (66 per cent) received inadequate or somewhat inadequate ratings for counseling services.

Adequacy of student transportation and teacher travel provisions related to operational aggregates. Tables XII-31 and XII-32 summarize pertinent data and report results of tests of significance pertaining to the relationship of provisions made for student transportation and teacher travel and operational aggregates of industrial education programs. With these data a series of six null hypotheses using the single classification analysis of variance technique were tested to the effect that there was no difference in operational aggregates between (1) provisions made for student transportation and (2) provisions made for teacher travel. Using the frequency distribution of schools within the various rating categories, the chi-square test of independency in contingency tables was applied to determine whether ratings assigned student transportation provisions and ratings assigned teacher travel provisions were independent of type of program classification.

In that the six null hypotheses for testing differences in operational aggregates among the various rating categories for student transportation and teacher travel were found to stand, no evidence was found to indicate a relationship between operational aggregates and the provisions made for either student transportation or teacher travel. The chi-square test of independency of the frequency distributions resulted in rejection of the null hypothesis pertaining to provisions for student transportation at the

TABLE XII - 31

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN ADEQUACY OF STUDENT TRANSPORTATION FACILITIES FOR TWO TYPES OF INDUSTRIAL EDUCATION PROGRAMS AND MEAN OPERATIONAL AGGREGATES

Type of program	Adequacy of Student Transportation Facilities: Inadequate N	Means	Somewhat inadequate N	Means	Somewhat adequate N	Means	Very adequate N	Means	P
Schools offering industrial arts only (n = 56)	37	521.92	1	506.00	12	541.75	6	577.33	NS
Schools offering both industrial arts and trade and industrial education (n = 19)	7	668.29	3	682.67	6	740.17	3	614.67	NS
All schools (n = 75)	44	545.20	4	638.50	18	607.89	9	589.78	NS

Chi-square test of independency of frequency distribution - $P < .05$

TABLE XII - 32

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN ADEQUACY OF TEACHER TRAVEL FUNDS FOR TWO TYPES OF INDUSTRIAL EDUCATION PROGRAMS AND MEAN OPERATIONAL AGGREGATES

Type of program	Adequacy of Teacher Travel Funds: Inadequate N	Means	Somewhat inadequate N	Means	Somewhat adequate N	Means	Very adequate N	Means	P
Schools offering industrial arts only (n = 56)	46	525.85	1	626.00	6	533.50	3	588.67	NS
Schools offering both industrial arts and trade and industrial education (n = 19)	13	685.92	3	698.00	2	715.50	1	569.00	NS
All schools (n = 75)	59	561.12	4	680.00	8	579.00	4	583.75	NS

Chi-square test of independency of frequency distribution - $P \geq .05$

5 per cent level, but the null hypothesis for teacher travel was found to be tenable. Observation of the data reported in Table XII-31 shows that a higher proportion of schools offering both industrial arts and trade and industrial education received somewhat or very adequate ratings (47 per cent) than did schools offering industrial arts only (32 per cent). Most notable in Table XII-32 is the fact that relatively few schools, regardless of the type of program, were rated as making adequate provisions for teacher travel; with but 3 of 19 of the combination type program group and 9 of 56 of the industrial arts only group receiving one or the other of the adequate ratings.

Usage of special service resources related to operational aggregates. Resources of a special nature, such as community talent and agencies, directed experience outside of the school shops, and student organizations, were rated on the basis of the extent to which these special resources were utilized to implement the instructional activities of industrial education programs. The schools, along with their operational aggregates of industrial education programs, were distributed into one of four usage rating categories. Tests of significance were made to determine whether there were differences in operational aggregates associated with usage of special resources and whether usage of special resources was independent of the type of program classification. Tables XII-33 to XII-35 report the results of the tests of significance.

As reported in Table XII-33, the null hypotheses tested to the effect that there was no difference in operational aggregates among the various extent of use groups (1) of the 75 industrial education programs studied and (2) of the 19 schools offering both industrial arts and trade and industrial education were rejected at the .1 per cent and 1 per cent levels of significance, respectively. However, the similar hypothesis tested for the 56 industrial arts only schools was found to stand. Thus, it may be concluded that a high relationship existed between program operations as measured by operational aggregates and the extent to which use was made of community talent and agencies to assist in the accomplishment of program objectives for industrial education programs generally and more particularly for the 19 schools offering both industrial arts and trade and industrial education. In this regard, the means of the operational aggregates were lowest where little use was made of community resources and high where community resources were used considerably. Despite this finding, the situation was such, as may be observed from the data reported in Table XII-33 that relatively few schools were availing themselves of the opportunity to use community talent and agencies as a resource to aid in program operations. There was greater liklihood that programs which included trade and industrial education classes than those of the industrial arts only

type would utilize special community resources. This fact was established by the chi-square test of independency of the frequency distribution applied to test whether the extent of use of community resources was independent of the type of program. The hypothesis was rejected at the 1 per cent level.

TABLE XII-33

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN USE OF COMMUNITY TALENT AND AGENCIES FOR TWO TYPES OF INDUSTRIAL EDUCATION PROGRAMS AND MEAN OPERATIONAL AGGREGATES

Type of program	Use of Community Talent and Agencies: Used little N	Means	Used moderately N	Means	Used considerably N	Means	Used extensively N	Means	P
Schools offering industrial arts only (n=56)	53	526.25	3	630.33	0		0		NS
Schools offering both industrial arts and trade and industrial education (n = 19)	13	645.69	2	765.00	4	771.75	0		.01
All schools (n = 75)	66	549.77	5	684.20	4	771.75	0		.001

Chi-square test of independency of frequency distribution - $P < .01$

Table XII-34 summarizes data and reports results of tests of significance showing the relationship between use of directed work experience outside the school shop and operational aggregates of industrial education programs. As reported in the probability column of the table, the results of tests of differences between means by single classification analysis of variance denoted that the hypotheses of no difference were tenable. The directed experience variable was not found to be highly related to operational aggregates. It might best be concluded that the very limited utilization of directed work experience as a special resource for program implementation did not make directed experience a discriminating variable. Of the 75 schools in the sample, 71 were in the "used little" category.

TABLE XII - 34

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN USE OF DIRECTED EXPERIENCE OUTSIDE OF SCHOOL SHOP FOR TWO TYPES OF INDUSTRIAL EDUCATION PROGRAMS AND MEAN OPERATIONAL AGGREGATES

Type of program	Use of Directed Experience Outside of School Shop: Used little N	Means	Used moderately N	Means	Used considerably N	Means	Used extensively N	Means	P
Schools offering industrial arts only (n = 56)	53	525.92	2	558.00	1	792.00	0		NS
Schools offering both industrial arts and trade and industrial education (n = 19)	18	676.83	1	828.00	0		0		NS
All schools (n = 75)	71	564.18	3	648.00	1	792.00	0		NS

Chi-square test of independency of frequency distribution - No test

TABLE XII - 35

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN USE OF STUDENT ORGANIZATIONS FOR TWO TYPES OF INDUSTRIAL EDUCATION PROGRAMS AND MEAN OPERATIONAL AGGREGATES

Type of program	Use of Student Organizations: Used little N	Means	Used moderately N	Means	Used considerably N	Means	Used extensively N	Means	P
Schools offering industrial arts only (n = 56)	52	533.13	1	387.00	2	587.50	1	497.00	NS
Schools offering both industrial arts and trade and industrial education (n = 19)	17	683.41	1	730.00	1	578.00	0		NS
All schools (n = 75)	69	571.39	2	558.50	3	584.33	1	497.00	NS

Chi-square test of independency of frequency distribution - No test

Data relating the use of student organizations (e.g. industrial arts clubs, hobby clubs, automobile clubs, and the like) to operational aggregates are reported in Table XII-35. The null hypotheses formulated to test that there was no difference in operational aggregates between the four-extent of use student organization groups were tenable. As was the case in the directed work experience variable, the absence or limited use of student organizations to aid program operations did not make student organizations a very discriminating variable among programs of industrial education. Student organizations were determined as being used little in 69 of the 75 industrial education programs.

The Relationship of Human Resources to Operational Aggregates

The point of view, not uncommon, that the teacher is the most important resource in implementation of the learning process is a value judgment very often made with limited basis in fact. Accepting this point of view is not wholly a willingness to rely on unsupported faith, but, rather, acknowledgement of reasonableness of this point of view on the basis of the presumptive evidence of logic. Furthermore, the teacher, as is true of all human beings, is a complex organism whose physiological and psychological makeup introduces an individual uniqueness and certain unpredicatables which complicate efforts to categorize individuals into meaningful groups and to control the effects of intervening variables. Thus, attempts to establish the relationship of teacher performance to characteristics identified with and isolated for groups of teachers must be made in light of the limitations imposed on the data. Be this as it may, there are external variables which can be identified and can serve to divide a population into several or more sub-populations. It may be reasoned that the more discrete the external variable, the more discriminating it will be as a variable identified with a particular condition or set of conditions. Then, too, the randomness of selection usually will cause the more intangible, internal variables to be distributed normally within the several or more groups. For purposes of this study, a selected number of characteristics of industrial education teachers were used to establish categories into which teachers were distributed. Using the single classification analysis of variance statistical procedure, a series of null hypotheses were tested to ascertain whether there were differences in operational aggregates of industrial education instructors related to variations among groups of instructors in (1)level of educational attainment, (2) teaching and non-teaching experience, (3) nature of graduate study, and (4) self-opinion estimates of competency.

Teacher qualifications related to operational aggregates. To ascertain whether such qualification characteristics identified with teachers as (1) type of college degree held, (2) amount in years of teaching experience, (3) tenure in years at present position,

(4) amount in years of experience other than teaching, and (5) amount in years of trade experience were related to operational emphasis and effort, a series of null hypotheses of the variety that there was no difference in operational aggregates between the categories established for each of the qualification characteristics were tested. Tables XII-36 through XII-40 summarize pertinent data and report results of tests of significance relative to the relationship between qualification characteristics of teachers and operational aggregates of industrial education teachers. Reported in addition to the tests of significance using the single classification analysis of variance are the results of tests of significance using the chi-square test of independency in contingency tables to ascertain whether qualification characteristics of teachers were independent of teacher classification based on the nature of the teaching assignment.

The information reported in Table XII-36 pertaining to level of education of teachers as measured by the degree held reveals a relatively consistent pattern between level of education and operational aggregates. It may be observed that as the level of education is more advanced the operational aggregate is larger. In this regard, the teacher group with the bachelor degree only had a mean operational aggregate of 579.32 as compared to a mean operational aggregate of 673.02 for the teachers who had pursued work beyond the Masters degree. However, the pattern of difference was not found to be great enough to cause rejection of the null hypothesis of no difference as tested for the total teacher population. Only in the case of the teachers of industrial arts were the differences in operational aggregates great enough to cause rejection of the null hypothesis of no difference ($P < .01$). The extent of the relationship for this sub-population is evident by the mean ranges of between 490.29 for the bachelors only group to 636.03 for the group that pursued work beyond the Masters degree. For the other sub-populations of teachers instructing in both industrial arts and trade and industrial education or instructing in trade and industrial education only, the differences in operational aggregates among the level of education groups were not found to vary to the extent that these differences could not have been accounted for by chance.

In that the hypothesis tested using the chi-square procedure was found to be tenable ($P > .05$), there was no evidence presented indicating that the differences in the proportion of teachers in any of the levels of education groups was dependent on teacher classification according to the subject area or areas taught.

TABLE XII-36

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN EDUCATION OF INDUSTRIAL EDUCATION TEACHERS AND MEAN OPERATIONAL ACCREDITATIONS OBTAINED FOR THREE CLASSIFICATIONS OF TEACHERS

Classification of teacher	Level of Education								
	B.S. Degree only		B.S. Degree plus additional courses		M.S. Degree only		M.S. Degree plus additional courses		
	N	Means	N	Means	N	Means	N	Means	P
Teaching industrial arts only (n=126; $\bar{X}$=559.48)	17	490.29	48	530.96	22	539.45	39	636.03	.01
Teaching both industrial arts and trade and industrial education (n=35; $\bar{X}$=699.74)	3	619.33	11	729.27	9	769.89	14	640.17	NS
Teaching trade and industrial education only (n = 23; $\bar{X}$ = 877.74)	5	858.00	7	863.43	5	795.80	6	979.17	NS
All teachers (n = 184; $\bar{X}$ = 625.94)	25	579.32	66	599.27	36	632.67	57	673.02	NS

Chi-square test of independency of frequency distribution - $P > .05$

In summary, these findings indicated that classification of teachers was not a situation variable highly associated with particular levels of education as measured by the degree held. Furthermore, although the pattern as it pertained to all teachers of industrial education subjects showed a direct relationship such that as educational levels increased so did operational levels, there was no basis found for not attributing this pattern to chance. However, when the apparent leveling influence of teachers classified as teaching in trade and industrial education was removed from the field of operation, the remaining sub-population of industrial arts only teachers were shown to be a group whose program operations increased greatly as did

the levels of educational attainment to the point where the differences could not have occurred by chance in more than one case out of each 100 cases. Thus, it could be defended that the odds would be considerably greater that the employment of industrial arts teachers with advanced levels of educational attainment would result in correspondingly higher levels of program operations. Such a position, however, could not be defended for the other classifications of teachers in the field of industrial education.

If the cliche 'experience is the best teacher' has basis in fact, it would be reasonable to expect the amount in years of teaching experience to be a variable related to measures of teaching performance. Some evidence pointing to substantiation of the cliche may be found from the data summarized and the results of tests of significance reported in Table XII-37. The null hypothesis tested to the effect that there was no difference in operational aggregates of industrial education teachers, regardless of classification, between the four years of experience groups was rejected at the 5 per cent level of significance. A similar hypothesis for the sub-population of industrial arts only classification also was rejected, and in this instance, at the one per cent level. From this evidence it may be concluded that a high relationship existed for industrial education teachers generally, or for the special classification of industrial arts only teachers, between amount in years of experience and levels of operations of teachers. Observation of the data suggests certain qualifications on the basis of the association of the means of operational aggregates to the various years of experience groups. It would appear that after completing up to two years of teaching experience, the pattern would not warrant support of the position that increased teaching experience *per se* was a factor that increased appreciably the odds that higher levels of operation would result. Then, too, it would appear that if a teacher had previous experience in trade and industrial education the total years of teaching experience becomes less indicative yet as a clue to potential operational differences among teachers.

Contrary to the generalization sometimes made that trade and industrial teachers as a group are the more experienced teachers, this was not found to be the case. The test of the null hypothesis to the effect that the proportion of teachers in the three classification of groups was independent of the amount of years of teaching experience was tenable at the accepted level of significance. Thus, no evidence was presented to support the position that more or less years of teaching experience was a factor associated with a higher proportion of industrial education teachers in one classification than in the others.

A similar series of tests of significance to those for total years of teaching experience were applied to determine the relationship

TABLE XII-37

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN TOTAL YEARS OF TEACHING EXPERIENCE OF INDUSTRIAL EDUCATION TEACHERS AND MEAN OPERATIONAL AGGREGATES FOR THREE CLASSIFICATIONS OF TEACHERS

	Years of Teaching Experience								
	Less than 2 years		3 - 5 years		6 - 10 years		11 or more years		
Classification of teacher	N	Means	N	Means	N	Means	N	Means	F
Teaching industrial arts only (n = 126; $\bar{X}$ = 559.48)	22	476.59	18	505.22	26	628.54	60	576.22	.01
Teaching both industrial arts and trade and industrial education (n = 35; $\bar{X}$ = 699.74)	5	664.20	4	749.25	8	656.13	18	718.00	NS
Teaching trade and industrial education only (n = 23; $\bar{X}$ = 877.74)	1	948.00	5	949.80	6	773.00	11	895.73	NS
All teachers (n = 184; $\bar{X}$ = 625.94)	28	526.93	27	683.70	40	655.73	89	644.38	.05

Chi-square test of independency of frequency distribution P -> .05

between tenure in years in present position of industrial education teachers and operational aggregates. The results of these tests were similar to those of total years of experience. The data reported in Table XII-38 show that the null hypotheses tested to the effect that there was no difference in operational aggregates between tenure groups were rejected at the 5 per cent and one per cent levels, respectively, for the total population of teachers and for the teachers classified as industrial arts only. However, the null hypotheses were found to stand for the teachers classified as teaching both industrial arts and trade and industrial education and as teaching trade and industrial education subjects only. Neither did the test using the chi-square procedure disclose evidence that the proportion of teachers in the various tenure groups varied significantly on the basis of teacher classification.

To ascertain whether amount in years of non-teaching experience was related to operational aggregates, appropriate groupings were established and tests of significance applied to the data as reported in Table XII-39. When all the teachers were considered as a single population, the null hypothesis that there was no difference in operational aggregates between the non-teaching years of experience groups was rejected at the .1 per cent level of significance. When similar tests were applied to the three sub-populations on the basis of teacher classification, the hypotheses were found to stand. Thus, it may be concluded that considering the industrial education teachers as a single population, that is, without regard to particular classification, the variability between years of non-teaching experience groups and operational aggregates is such that it could have occurred by chance in fewer than one case out of each 100 cases. However, the sub-population tests suggest that teacher classification was an intervening variable that would make questionable interpretations based on the whole instead of the parts. In this regard, the chi-square test of independency of the frequency distribution resulted in the rejection of the null hypothesis at the .1 per cent level. Rejection of the hypothesis establishes that the proportion of teachers varied considerably among the years of non-teaching experience groups on the basis of teacher classification. It may be observed from the frequency distribution that a proportionally greater number of teachers of trade and industrial education subjects only than combination teachers or industrial arts only teachers had more years of non-teaching experience.

A final series of tests of significance were applied to determine the relationship between amount in years of trade experience of industrial education teachers and operational aggregates of instructors of industrial education. Table XII-40 summarizes pertinent data and reports the results of the tests of significance. The null hypotheses that there was no difference in operational aggregates between the four years of trade experience groups were rejected at the .1 per cent and 5 per

TABLE XII-38

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN YEARS OF TEACHING EXPERIENCE IN PRESENT POSITION OF INDUSTRIAL EDUCATION AND MEAN OPERATIONAL AGGREGATES FOR THREE CLASSIFICATIONS OF TEACHERS

	Years of Teaching Experience in Present Position								
	Less than 2 years		3 - 5 years		6 - 10 years		11 or more years		
Classification of teacher	N	Means	N	Means	N	Means	N	Means	P
Teaching industrial arts only ($n = 126$; $\bar{X} = 559.48$)	31	482.68	29	539.55	26	591.58	40	612.58	.01
Teaching both industrial arts and trade and industrial education ($n = 35$; $\bar{X} = 699.74$)	7	707.29	8	701.75	7	735.43	13	675.23	NS
Teaching trade and industrial education only ($n = 23$; $\bar{X} = 877.74$)	3	839.00	6	977.67	5	756.20	9	891.56	NS
All teachers ($n = 184$; $\bar{X} = 625.94$)	41	547.10	43	630.86	38	639.74	62	666.21	.05

Chi-square test of independency of frequency distribution P - >.05

TABLE XII-39

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN EXPERIENCE OTHER THAN TEACHING OF INDUSTRIAL EDUCATION TEACHERS AND MEAN OPERATIONAL AGGREGATES FOR THREE CLASSIGICATIONS OF TEACHERS

Classification of teacher	Years of Experience: Less than 2 years		3 - 5 years		6 - 10 years		11 or more years		
	N	Means	N	Means	N	Means	N	Means	P
Teaching industrial arts only ($n = 125$; $\bar{X} = 561.00$)	42	523.07	37	603.24	28	535.71	18	602.00	NS
Teaching both industrial arts and trade and industrial education ($n = 35$; $\bar{X} = 699.74$)	7	741.14	16	666.63	7	631.57	5	843.20	NS
Teaching trade and industrial education only ($n = 23$; $\bar{X} = 877.74$)	1	878.00	3	714.67	8	862.00	11	933.64	NS
All teachers ($n = 183$; $\bar{X} = 627.34$)	50	560.00	56	627.32	43	612.02	34	744.76	.001

Chi-square test of independency of frequency distribution - $P < .001$

TABLE XII-40

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN TRADE EXPERIENCE OF INDUSTRIAL EDUCATION TEACHERS AND MEAN OPERATIONAL AGGREGATES FOR THREE CLASSIFICATIONS OF TEACHERS

Classification of teacher	Years of Experience: Less than 2 years		3 - 5 years		6 - 10 years		11 or more years		
	N	Means	N	Means	N	Means	N	Means	P
Teaching industrial arts only ($n = 124$; $\bar{X} = 561.52$)	57	521.18	34	606.06	20	550.85	13	638.77	NS
Teaching both industrial arts and trade and industrial education ($n = 35$; $\bar{X} = 699.74$)	10	698.40	16	684.50	4	584.75	5	843.20	NS
Teaching trade and industrial education only ($n = 23$; $\bar{X} = 877.74$)	2	886.00	3	714.67	7	857.43	11	933.64	NS
All teachers ($n = 182$; $\bar{X} = 628.07$)	69	557.36	53	635.89	31	624.45	29	785.86	.001

Chi-square test of independency of frequency distribution - $P < .001$

cent levels of significance, respectively, for the total population of 182 teachers and for the sub-population of 124 industrial arts only classification of teachers. The hypotheses of no difference were found to stand for the two classifications of the both industrial arts and trade and industrial education teachers and of the trade and industrial education only teachers. These findings have more meaning when viewed in light of the chi-square test applied to the frequency distribution to ascertain whether the proportion of teachers in the various years of trade experience groups was independent of teacher classification. The null hypothesis thus tested was rejected at the .1 per cent level of significance. It may be observed that whereas 78 per cent of the trade and industrial education only classification of teachers had 6 or more years of trade experience only about 26 per cent of the teachers in the other classification had 6 or more years of trade experience.

In summary, a more realistic picture of the relationship between qualification characteristics of industrial education teachers and teacher performance as measured by operational aggregates is evident when teacher classification is controlled. In this regard, it would appear as if the qualification factors selected for study were more discriminating as variables related to operational aggregates for industrial arts only teachers than for teachers classified as those teaching both industrial arts and trade and industrial education or those teaching trade and industrial education only. Except for non-teaching experience, the teacher qualification characteristics were found to be variables highly related to operational aggregates. Operational aggregates were generally higher where industrial arts teachers had advanced degrees, more than two years of teaching experience, longer tenure, and trade experience. No evidence was disclosed, however, to suggest that instructors classified as teaching in the combination field or teaching trade and industrial education subjects only had variations in qualification characteristics highly related to operational aggregates.

Nature of graduate study related to operational aggregates. Teachers of industrial education subjects who had pursued educational work beyond the requirements of the bachelors degree were asked to indicate the subject fields in which the work was undertaken. The ten areas of graduate work included (1) related science, (2) general engineering, (3) advanced management, (7) foundations of education, (8) educational guidance, (9) educational administration, and (10) industrial education. On the basis of having or not having work in one or the other of the ten subject areas, the total population of advanced education teachers, as well as the several sub-populations according to classification, were distributed, along with the applicable operational aggregate, into either the "yes" group or the "no" group. These distributions were then used to test a series of null hypotheses

to the effect that there was no difference in operational aggregates between those teachers who had and those who had not taken graduate courses in each of the afore mentioned areas. The single classification analysis of variance statistical procedure was employed to test the hypotheses. Other null hypotheses were tested to the effect that the proportion of teachers who had or had not pursued advanced education in each of the selected areas was independent of teacher classification. The chi-square test of independency of frequency distributions was the statistical procedure used to determine whether the hypotheses would stand or be rejected. Pertinent data and results of statistical tests of significance pertaining to areas of graduate study are reported in Tables XII-41 through XII-50.

When the industrial education teachers who had pursued advanced course work in education were considered a single population and not classified according to the nature of the subjects taught within the field of industrial education, there were five subject areas in which there were significant differences found in operational aggregates between the group of teachers who had and the group of teachers who had not pursued advanced study in these subject areas. The null hypotheses of no difference were rejected at the 5 per cent, or greater level of significance, for the subject areas of (1) general engineering, (2) advanced shop training, (3) industrial management, (4) educational guidance, and (5) industrial education. The means of the operational aggregates in each of the instances was considerably larger for the group who had pursued advanced work in these subject areas than those in the group who had not pursued advanced work in these areas. Interestingly, and with the single exception of related science, the pattern of difference between the means of the operational aggregates also were similar for the other subject areas. However, the differences were not great enough to cause rejection of the hypotheses.

For the sub-population of 126 industrial arts only teachers, there was only one area of study in which pursuing advanced work showed a high relationship to the operational aggregates. The probability column in Table XII-49 shows that the null hypothesis to

TABLE XII - 41

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN WHETHER INDUSTRIAL EDUCATION TEACHERS HAVE PURSUED GRADUATE WORK IN RELATED SCIENCE AND MEAN OPERATIONAL AGGREGATES OBTAINED FOR THREE CLASSIFICATIONS OF TEACHERS

	Had Graduate Work in Related Science				
	yes		no		
Classification of teacher	N	Means	N	Means	P
Teaching industrial arts only ($n = 126$; $\bar{X} = 559.48$)	7	514.57	119	562.12	NS
Teaching both industrial arts and trade and industrial education ($n = 35$; $\bar{X} = 699.74$)	4	673.00	31	703.19	NS
Teaching trade and industrial education only ($n = 23$; $\bar{X} = 877.74$)	0	0	23	877.74	NS
All teachers ($n = 184$; $\bar{X} = 625.94$)	11	572.18	173	629.36	NS
Chi-square test of independency of frequency distribution - $P > .05$					

TABLE XII - 42

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN WHETHER INDUSTRIAL EDUCATION TEACHERS HAVE PURSUED GRADUATE WORK IN GENERAL ENGINEERING AND MEAN OPERATIONAL AGGREGATES OBTAINED FOR THREE CLASSIFICATIONS OF TEACHERS

	Had Graduate Work in General Engineering				
	Yes		No		
Classification of teacher	N	Means	N	Means	P
Teaching industrial arts only ($n = 126$; $\bar{X} = 559.48$)	10	630.00	116	553.40	NS
Teaching both industrial arts and trade and industrial education ($n = 35$; $\bar{X} = 699.74$)	4	770.00	31	690.68	NS
Teaching trade and industrial education only ($n = 23$; $\bar{X} = 877.74$)	4	974.25	19	857.42	NS
All teachers ($n = 184$; $\bar{X} = 625.94$)	18	737.61	166	613.83	.01
Chi square test of independency of frequency distribution - $P > .05$					

TABLE XIV - 43

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN WHETHER INDUSTRIAL EDUCATION TEACHERS HAVE PURSUED GRADUATE WORK IN ADVANCED SHOP TRAINING AND MEAN OPERATIONAL AGGREGATES OBTAINED FOR THREE CLASSIFICATIONS OF TEACHERS

Classification of teacher	Had Graduate Work in Advanced Shop Training: Yes N	Yes Means	No N	No Means	P
Teaching industrial arts only ($n = 126$; $\bar{X} = 559.48$)	38	595.74	88	543.82	NS
Teaching both industrial arts and trade and industrial education ($n = 35$; $\bar{X} = 699.74$)	16	698.94	19	700.42	NS
Teaching trade and industrial education only ($n = 23$; $\bar{X} = 877.74$)	9	935.00	14	840.93	NS
All teachers ($n = 184$; $\bar{X} = 625.94$)	63	670.41	121	602.79	.05

Chi-square test of independency of frequency distribution - $P > .05$

TABLE XII - 44

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN WHETHER INDUSTRIAL EDUCATION TEACHERS HAVE PURSUED GRADUATE WORK IN SOCIOLOGY AND MEAN OPERATIONAL AGGREGATES OBTAINED FOR THREE CLASSIFICATIONS OF TEACHERS

	Had Graduate Work in Sociology				
	Yes		No		
Classification of teacher	N	Means	N	Means	P
Teaching industrial arts only ($n = 126$; $\bar{X} = 559.48$)	6	603.67	120	557.27	NS
Teaching both industrial arts and trade and industrial education ($n = 35$; $\bar{X} = 699.74$)	3	651.67	32	704.25	NS
Teaching trade and industrial education only ($n = 23$; $\bar{X} = 877.74$)	2	1050.50	21	861.29	NS
All teachers ($n = 184$; $\bar{X} = 625.94$)	11	698.00	173	621.36	NS

Chi-square test of independency of frequency distribution - $P > .05$

TABLE XII - 45

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN WHETHER INDUSTRIAL EDUCATION TEACHERS HAVE PURSUED GRADUATE WORK IN GENERAL ECONOMICS AND MEAN OPERATIONAL AGGREGATES OBTAINED FOR THREE CLASSIFICATIONS OF TEACHERS

Classification of teacher	Had Graduate Work in General Economics: Yes N	Yes Means	No N	No Means	P
Teaching industrial arts only ($n = 126$; $\bar{X} = 559.48$)	4	634.25	122	557.02	NS
Teaching both industrial arts and trade and industrial education ($n = 35$; $\bar{X} = 699.74$)	2	725.50	33	698.18	NS
Teaching trade and industrial education only ($n = 23$; $\bar{X} = 877.74$)	1	1209.00	22	862.68	.05
All teachers ($n = 184$; $\bar{X} = 625.94$)	7	742.43	177	621.33	NS

Chi-square test of independency of frequency distribution - $P > .05$

TABLE XII - 46

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN WHETHER INDUSTRIAL EDUCATION TEACHERS HAVE PURSUED GRADUATE WORK IN INDUSTRIAL MANAGEMENT AND MEAN OPERATIONAL AGGREGATES OBTAINED FOR THREE CLASSIFICATIONS OF TEACHERS

Classification of teacher	Had Graduate Work in Industrial Management: Yes N	Yes Means	No N	No Means	P
Teaching industrial arts only ($n = 126$; $\bar{X} = 559.48$)	13	590.54	113	555.90	NS
Teaching both industrial arts and trade and industrial education ($n = 35$; $\bar{X} = 699.74$)	9	709.78	26	696.27	NS
Teaching trade and industrial education only ($n = 23$; $\bar{X} = 877.74$)	5	1005.00	18	842.39	.05
All teachers ($n = 184$; $\bar{X} = 625.94$)	27	707.04	157	611.99	.05

Chi-square test of independency of frequency distribution - $P < .05$

TABLE XII - 47

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN WHETHER INDUSTRIAL EDUCATION TEACHERS HAVE PURSUED GRADUATE WORK IN FOUNDATIONS OF EDUCATION AND MEAN OPERATIONAL AGGREGATES OBTAINED FOR THREE CLASSIFICATIONS OF TEACHERS

	Had Graduate Work in Foundations of Education				
	Yes		No		
Classification of teacher	N	Means	N	Means	P
Teaching industrial arts only ($n = 126$; $\bar{X} = 559.48$)	61	576.72	65	543.29	NS
Teaching both industrial arts and trade and industrial education ($n = 35$; $\bar{X} = 699.74$)	20	699.25	15	700.40	NS
Teaching trade and industrial education only ($n = 23$; $\bar{X} = 877.74$)	16	875.31	7	883.29	NS
All teachers ($n = 184$; $\bar{X} = 625.94$)	97	651.24	87	597.74	NS

Chi-square test of independency of frequency distribution - $P > .05$

TABLE XII-48

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN WHETHER INDUSTRIAL EDUCATION TEACHERS HAVE PURSUED GRADUATE WORK IN EDUCATIONAL GUIDANCE AND MEAN OPERATIONAL AGGREGATES OBTAINED FOR THREE CLASSIFICATIONS OF TEACHERS

	Had Graduate Work in Educational Guidance				
	Yes		No		
Classification of teacher	N	Means	N	Means	P
Teaching industrial arts only ($n = 126$; $\bar{X} = 559.48$)	54	578.65	72	545.10	NS
Teaching both industrial arts and trade and industrial education ($n = 35$; $\bar{X} = 699.74$)	18	711.78	17	687.00	NS
Teaching trade and industrial education only ($n = 23$; $\bar{X} = 877.74$)	17	883.76	6	860.67	NS
All teachers ($n = 184$; $\bar{X} = 625.94$)	89	663.85	95	590.42	.01

Chi-square test of independency of frequency distribution - $P < .05$

TABLE XII - 49

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN WHETHER INDUSTRIAL EDUCATION TEACHERS HAVE PURSUED GRADUATE WORK IN INDUSTRIAL EDUCATION AND MEAN OPERATIONAL AGGREGATES OBTAINED FOR THREE CLASSIFICATIONS OF TEACHERS

Classification of teacher	Had Graduate Work in Industrial Education: Yes N	Yes Means	No N	No Means	P
Teaching industrial arts only ($n = 126$; $\bar{X} = 559.48$)	62	613.52	64	507.13	.001
Teaching both industrial arts and trade and industrial education ($n = 35$; $\bar{X} = 699.74$)	23	703.35	12	689.00	NS
Teaching trade and industrial education only ($n = 23$; $\bar{X} = 877.74$)	20	877.75	3	877.67	NS
All teachers ($n = 184$; $\bar{X} = 625.94$)	105	683.96	79	548.82	.001

Chi-square test of independency of frequency distribution - $P < .01$

TABLE XII - 50

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN WHETHER INDUSTRIAL EDUCATION TEACHERS HAVE PURSUED GRADUATE WORK IN EDUCATIONAL ADMINISTRATION AND MEAN OPERATIONAL AGGREGATES OBTAINED FOR THREE CLASSIFICATIONS OF TEACHERS

	Had Graduate Work in Educational Administration				
	Yes		No		
Classification of teacher	N	Means	N	Means	P
Teaching industrial arts only ($n = 126$; $\bar{X} = 559.48$)	51	582.24	75	544.00	NS
Teaching both industrial arts and trade and industrial education ($n = 35$; $\bar{X} = 699.74$)	17	697.24	18	702.11	NS
Teaching trade and industrial education only ($n = 23$; $\bar{X} = 877.74$)	12	877.92	11	877.55	NS
All teachers ($n = 184$; $\bar{X} = 625.94$)	80	651.03	104	606.64	NS

Chi-square test of independency of frequency distribution - $P > .05$

the effect that there was no difference in operational aggregates between the group who had and the group who had not pursued advanced work in industrial education was rejected at the .1 per cent level of significance. It may be observed that the mean of the "yes" group was 613.52 and more than 100 points greater than the mean of 507.13 for the "no" group.

Although the pattern of variation between the means of the operational aggregates identified with each of the subject areas investigated was similar between the total population and each of the sub-populations, the classification of instructors as those teaching both industrial arts and trade and industrial subjects was a sub-population for which all the null hypotheses to test no difference was found to stand. Consequently, no evidence was disclosed to indicate a high relationship between operational aggregates and having or not having pursued advanced study in any of the subject fields for this sub-population.

For the sub-population of teachers classified as those teaching trade and industrial education subjects only, it was found that a high relationship existed between advanced education in the fields of general economics and industrial management and operational aggregates of instructors of industrial education. For these two tests of significance, the null hypotheses of no difference were rejected at the 5 per cent level.

Reported also in Tables XII-41 through XII-50 were results of tests of significance applied to determine whether the proportion of teachers who had and who had not pursued advanced study in the areas selected for study was independent of whether the teachers were classified as industrial arts only, as teaching in both industrial arts and trade and industrial education, and as trade and industrial education only. The null hypotheses tested as pertaining to related science, general engineering, advanced shop training, sociology, general economics, foundations of education, and educational administration were found to stand. In these instances no evidence was disclosed to indicate that a significantly greater proportion of teachers in one of the classifications as compared to the others was pursuing advanced work in one or the other of these fields of study. It should be noted that relatively few teachers had indicated any course work beyond the bachelors degree was pursued in the fields of related science, general engineering, sociology, and general economics. The chi-square test applied to the frequency distributions shown in Tables XII-46, XII-48, and XII-49 resulted in chi square values such that the null hypotheses of independence were rejected at the 5 per cent, or greater, level of significance. These results submit evidence that the proportion of teachers who had pursued advanced study in the fields of industrial management, educational

guidance, and industrial education varied according to teacher classification. Observation of the data shows that a lower proportion of industrial arts only teachers had pursued work in the fields of educational guidance and industrial education than had teachers in either of the other classifications.

Opinion estimates of competency related to operational aggregates. In addition to the qualification characteristics and the nature of advanced study of industrial education teachers as human resource variables related to operational aggregates, opinion estimates as to competency were solicited from teachers to be used as a variable to relate to operational aggregates. Industrial education teachers made opinion estimates to indicate the extent to which they believed their background of training and experience made them competent in the fields of (1) related science, (2) general engineering, (3) sociology, (4) general economics, (5) industrial management, (6)shop mechanics, (7) foundations of education, (8) educational guidance, (9) industrial education, and (10) educational administration. Based on the extent to which opinions indicated adequacy, groupings were established into which teachers and the corresponding operational aggregates were distributed. These data were used to apply tests of significance using the single classification analysis to variance to test null hypotheses of no difference and the chi-square test in contingency tables to test null hypotheses of independency of frequency distributions. Tables XII-51 through XII-60 show the means of operational aggregates and the frequency distributions of teachers according to opinion estimates of adequacy groups and teacher classification groups. Reported also in the tables are the results of tests of significance.

Statistical tests of a series of null hypotheses to the effect that there was no difference in operational aggregates between the inadequate, adequate, and very adequate opinion estimates of competency groups for 176 industrial education teachers were applied to the data. Of the ten areas in which opinion estimates of competency were solicited, the null hypotheses pertaining to seven of these areas were rejected at the 5 per cent, or greater, level of significance. Only in the cases of the hypotheses tested for foundations of education, educational guidance, and educational administration were the differences between operational aggregates of the opinion estimate groups not found to be great enough to cause rejection at the accepted level of significance. Evidence was disclosed, however, to indicate a high relationship existed between how competent industrial education teachers as a single group believed they were in the subject areas of (1) related science, (2) general engineering, (3) sociology, (4) general economics, (5) industrial management, (6) shop mechanics, and (7) industrial education and the operational aggregates of the industrial education teachers. Observation of the data shows a uniform pattern of relation-

TABLE XII-51

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN OPINION ESTIMATES OF INDUSTRIAL EDUCATION TEACHERS AS TO COMPETENCY IN RELATED SCIENCE BASED ON TRAINING AND EXPERIENCE, AND MEAN OPERATIONAL AGGREGATES FOR THREE CLASSIFICATIONS OF TEACHERS

	Degree of Adequacy in Related Science						
	Inadequate		Adequate		Very Adequate		
Classification of teacher	N	Means	N	Means	N	Means	P
Teaching industrial arts only ($n = 119$; $\bar{X} = 555.86$)	33	490.85	65	562.00	21	639.00	.01
Teaching both industrial arts and trade and industrial education ($n = 34$; $\bar{X} = 693.47$)	6	721.67	18	680.33	10	700.20	NS
Teaching trade and industrial education only ($n = 23$; $\bar{X} = 877.74$)	4	841.25	8	917.75	11	861.91	NS
All teachers ($n = 176$; $\bar{X} = 624.51$)	43	555.65	91	616.68	42	711.95	.001

Chi-square test of independency of frequency distribution - $P < .05$

TABLE XII-52

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN OPINION ESTIMATES OF INDUSTRIAL EDUCATION TEACHERS AS TO COMPETENCY IN GENERAL ENGINEERING BASED ON TRAINING AND EXPERIENCE, AND MEAN OPERATIONAL AGGREGATES FOR THREE CLASSIFICATIONS OF TEACHERS

	Degree of Adequacy in General Engineering						
	Inadequate		Adequate		Very Adequate		
Classification of teacher	N	Means	N	Means	N	Means	P
Teaching industrial arts only ($n = 118$; $\bar{X} = 554.47$)	48	498.83	48	596.15	22	584.95	.01
Teaching both industrial arts and trade and industrial education ($n = 34$; $\bar{X} = 693.47$)	12	721.08	16	661.81	6	722.67	NS
Teaching trade and industrial education only ($n = 22$; $\bar{X} = 870.14$)	4	796.25	11	884.36	7	890.00	NS
All teachers ($n = 174$; $\bar{X} = 621.55$)	64	559.09	75	652.43	35	669.57	.01

Chi-square test of independency of frequency distribution - $P > .05$

TABLE XII-53

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN OPINION ESTIMATES OF INDUSTRIAL EDUCATION TEACHERS AS TO COMPETENCY IN SOCIOLOGY BASED ON TRAINING AND EXPERIENCE, AND MEAN OPERATIONAL AGGREGATES FOR THREE CLASSIFICATIONS OF TEACHERS

	Degree of Adequacy in Sociology						
	Inadequate		Adequate		Very Adequate		
Classification of teacher	N	Means	N	Means	N	Means	P
Teaching industrial arts only ($n = 115$; $\bar{X} = 553.35$)	27	510.11	67	537.31	21	660.10	.001
Teaching both industrial arts and trade and industrial education ($n = 34$; $\bar{X} = 693.47$)	6	671.83	24	701.00	4	680.75	NS
Teaching trade and industrial education only ($n = 22$; $\bar{X} = 877.09$)	8	793.25	10	912.90	4	955.25	NS
All teachers ($n = 171$; $\bar{X} = 622.86$)	41	589.02	101	613.40	29	703.66	.05

Chi-square test of independency of frequency distribution - $P > .05$

TABLE XII-54

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN OPINION ESTIMATES OF INDUSTRIAL EDUCATION TEACHERS AS TO COMPETENCY IN GENERAL ECONOMICS BASED ON TRAINING AND EXPERIENCE, AND MEAN OPERATIONAL AGGREGATES FOR THREE CLASSIFICATIONS OF TEACHERS

	Degree of Adequacy in General Economics						
	Inadequate		Adequate		Very Adequate		
Classification of teacher	N	Means	N	Means	N	Means	P
Teaching industrial arts only ($n = 116$; $\bar{X} = 555.37$)	36	493.72	66	571.56	14	637.51	.01
Teaching both industrial arts and trade and industrial education ($n = 33$; $\bar{X} = 691.76$)	5	684.00	25	703.00	3	611.00	NS
Teaching trade and industrial education only ($n = 23$; $\bar{X} = 877.74$)	7	840.57	13	883.31	3	940.33	NS
All teachers ($n = 172$; $\bar{X} = 624.65$)	48	564.13	104	642.13	20	679.00	.05

Chi-square test of independency of frequency distribution - $P > .05$

TABLE XII-55

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN OPINION ESTIMATES OF INDUSTRIAL EDUCATION TEACHERS AS TO COMPETENCY IN INDUSTRIAL MANAGEMENT BASED ON TRAINING AND EXPERIENCE, AND MEAN OPERATIONAL AGGREGATES FOR THREE CLASSIFICATIONS OF TEACHERS

	Degree of Adequacy in Industrial Management						
	Inadequate		Adequate		Very Adequate		
Classification of teacher	N	Means	N	Means	N	Means	P
Teaching industrial arts only ($n = 118$; $\bar{X} = 557.01$)	42	495.36	55	594.11	21	581.24	.01
Teaching both industrial arts and trade and industrial education ($n = 33$; $\bar{X} = 689.64$)	10	733.30	17	638.18	6	762.67	NS
Teaching trade and industrial education only ($n = 22$; $\bar{X} = 881.41$)	3	744.67	10	882.30	9	926.00	NS
All teachers ($n = 173$; $\bar{X} = 623.56$)	55	552.95	82	638.39	36	697.67	.01

Chi-square test of independency of frequency distribution - $P > .05$

TABLE XII-56

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN OPINION ESTIMATES OF INDUSTRIAL EDUCATION TEACHERS AS TO COMPETENCY IN SHOP MECHANICS BASED ON TRAINING AND EXPERIENCE, AND MEAN OPERATIONAL AGGREGATES FOR THREE CLASSIFICATIONS OF TEACHERS

	Degree of Adequacy in Shop Mechanics						
	Inadequate		Adequate		Very Adequate		
Classification of teacher	N	Means	N	Means	N	Means	P
Teaching industrial arts only. ($n = 124$; $\bar{X} = 558.19$)	2	349.00	40	536.03	82	574.10	NS
Teaching both industrial arts and trade and industrial education ($n = 34$; $\bar{X} = 693.47$)	3	718.33	8	664.50	23	700.30	NS
Teaching trade and industrial education only ($n = 23$; $\bar{X} = 877.74$)	0		2	713.50	21	893.38	NS
All teachers ($n = 181$; $\bar{X} = 624.20$)	5	570.60	50	563.68	126	650.35	.05

Chi-square test of independency of frequency distribution - $P < .02$

TABLE XII - 57

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN OPINION ESTIMATES OF INDUSTRIAL EDUCATION TEACHERS AS TO COMPETENCY IN FOUNDATIONS OF EDUCATION BASED ON TRAINING AND EXPERIENCE, AND MEAN OPERATIONAL AGGREGATES FOR THREE CLASSIFICATIONS OF TEACHERS

	Degree of Adequacy in Foundations of Education						
	Inadequate		Adequate		Very adequate		
Classification of teacher	N	Means	N	Means	N	Means	P
Teaching industrial arts only ($n = 120$; $\bar{X} = 557.03$)	5	599.60	48	519.13	67	581.00	NS
Teaching both industrial arts and trade and industrial education ($n = 33$; $\bar{X} = 696.67$)	1	755.00	13	730.31	19	670.58	NS
Teaching trade and industrial education only ($n = 23$; $\bar{X} = 877.74$)	1	785.00	9	904.67	13	866.23	NS
All teachers ($n = 176$; $\bar{X} = 625.12$)	7	648.29	70	607.91	99	635.65	NS

Chi-square test of independency of frequency distribution - $P > .05$

TABLE XII - 58

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN OPINION ESTIMATES OF INDUSTRIAL EDUCATION TEACHERS AS TO COMPETENCY IN EDUCATIONAL GUIDANCE BASED ON TRAINING AND EXPERIENCE, AND MEAN OPERATIONAL AGGREGATES FOR THREE CLASSIFICATIONS OF TEACHERS

	Degree of Adequacy in Educational Guidance						
	Inadequate		Adequate		Very adequate		
Classification of teacher	N	Means	N	Means	N	Means	P
Teaching industrial arts only ($n = 123$; $\bar{X} = 559.67$)	16	538.38	54	517.67	53	608.89	.01
Teaching both industrial arts and trade and industrial education ($n = 34$; $\bar{X} = 693.47$)	2	543.00	20	727.35	12	662.08	NS
Teaching trade and industrial education only ($n = 23$; $\bar{X} = 877.74$)	1	927.00	13	840.92	9	925.44	NS
All teachers ($n = 180$; $\bar{X} = 625.58$)	19	559.32	87	614.17	74	656.01	NS

Chi-square test of independency of frequency distribution - $P > .05$

TABLE XII - 59

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN OPINION ESTIMATES OF INDUSTRIAL EDUCATION TEACHERS AS TO COMPETENCY IN INDUSTRIAL EDUCATION BASED ON TRAINING AND EXPERIENCE, AND MEAN OPERATIONAL AGGREGATES FOR THREE CLASSIFICATIONS OF TEACHERS

Classification of teacher	Degree of Adequacy in Industrial Education: Inadequate N	Inadequate Means	Adequate N	Adequate Means	Very adequate N	Very adequate Means	P
Teaching industrial arts only ($n = 126$; $\bar{X} = 559.48$)	6	503.00	35	521.00	85	579.31	NS
Teaching both industrial arts and trade and industrial education ($n = 34$; $\bar{X} = 693.47$)	0		11	657.36	23	710.74	NS
Teaching trade and industrial education only ($n = 23$; $\bar{X} = 877.74$)	1	812.00	4	858.75	18	885.61	NS
All teachers ($n = 183$; $\bar{X} = 624.37$)	7	547.14	50	578.02	126	647.06	.05

Chi-square test of independency of frequency distribution - $P > .05$

TABLE XII-60

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE RELATIONSHIP BETWEEN OPINION ESTIMATES OF INDUSTRIAL EDUCATION TEACHERS AS TO COMPETENCY IN EDUCATION ADMINISTRATION BASED ON TRAINING AND EXPERIENCE, AND MEAN OPERATIONAL AGGREGATES FOR THREE CLASSIFICATIONS OF TEACHERS

	Degree of Adequacy in Education Administration						
	Inadequate		Adequate		Very Adequate		
Classification of teacher	N	Means	N	Means	N	Means	P
Teaching industrial arts only ($n = 119$; $\bar{X} = 557.30$)	18	496.28	57	541.02	44	603.36	.05
Teaching both industrial arts and trade and industrial education ($n = 34$; $\bar{X} = 693.47$)	5	610.60	22	722.09	7	662.71	NS
Teaching trade and industrial education only ($n = 23$; $\bar{X} = 877.74$)	4	810.00	11	882.18	8	905.50	NS
All teachers ($n = 176$; $\bar{X} = 625.48$)	27	563.93	90	626.98	59	651.37	NS

Chi-square test of independency of frequency distribution – $P > .05$

ship between opinion estimate categories and the means of the operational aggregates. In this regard, the lowest means of operational aggregates were associated with the "inadequate" group, the middle means in size were associated with the middle, or "adequate" group, and the highest means were associated with the "very adequate" group. These findings suggest that belief of competence on the part of teachers in subject areas identified with teaching industrial education bears on operational emphasis and effort put forth to accomplish course objectives.

Separate tests of significance were made for null hypotheses of no difference for the three sub-populations of teachers classified on the basis of the subject areas taught. The series of null hypotheses tested as applying to the 34 teachers of both industrial arts and trade and industrial education and of the 23 teachers classified as trade and industrial education only were all found to stand. That is, no evidence was disclosed to indicate that opinion estimates of these groups of teachers as to competency in the ten subject areas were highly related to operational aggregates determined for these teachers. An interesting phenomenon evident from the data shown in Tables XII-51 through XII-60 was the difference in pattern of association between the means of the operational aggregates of the instructors teaching both industrial arts and trade and industrial education and of the instructors teaching industrial arts only or trade and industrial education only. The general pattern of association between competency opinions and means of operational aggregates for industrial arts only and trade and industrial education only teachers showed a direct relationship such that as opinion estimates of competency were higher so were the means of the operational aggregates. However, this pattern did not hold for the instructors classified as teaching both industrial arts and trade and industrial education. For this group of 34 teachers it may be observed, that no clearly identifiable pattern of association between opinion estimates of competency and operational aggregates could be depicted.

For the sub-population of 119 teachers of industrial arts only, it was found that opinion estimates of competency were highly related to operational aggregates in seven of the ten subject areas. The null hypotheses tested to the effect that there was no difference in operational aggregates between the three opinion estimate groups were rejected at the 5 per cent, or great level of significance for (1) related science, (2) general engineering, (3) sociology, (4) general economics, (5) industrial management, (6) educational guidance, and (7) educational administration. Only in the instances pertaining to shop mechanics, foundations of education, and industrial education were the differences not found to be great enough to cause rejection of the hypotheses.

To add greater insight into the findings that related teacher opinion estimates of competency in ten subject areas to operational aggregates of teachers, a series of null hypotheses were formulated to test whether the proportion of teachers indicating competency in the three adequacy categories was independent of teacher classification. The ten tests of significance using the chi-square test of independency of the frequency distributions resulted in the rejection of two of the hypotheses. As reported in Table XII-51, pertaining to related science, and in Table XII-56, pertaining to shop mechanics, the null hypotheses were rejected at the 5 per cent and 2 per cent levels, respectively. Observation of the frequency distributions in these instances reveals that the proportion of teachers indicating competency as being very adequate was greater for the instructors teaching trade and industrial education subjects than for the teachers of industrial arts only.

In the instances where the null hypotheses were found to be tenable, the frequency distributions, it may be observed, were quite similar. In this regard, the tendency was for a high proportion of teachers in all classifications to indicate their competency as being either adequate or inadequate for the subject fields of sociology and general economics. However, for the subject fields of foundations of education, educational guidance, industrial education, and education administration, the tendency for a high proportion of teachers of all classifications was to check either the adequate or very adequate categories as indicative of their competency. Varying somewhat from this general pattern were the reactions to competency in the fields of general engineering and industrial management. Although the differences were not determined as being significant in these instances, a higher proportion of trade and industrial education teachers only than the proportion of combination teachers or teachers of industrial arts only indicated that they believed their competency in these fields was very adequate.

V. THE COMBINATION OF VARIABLES FOR MULTIPLE REGRESSION

Thus far, Chapter XII has presented the results of a series of tests of significance designed to ascertain which of a number of selected variables were or were not related significantly to variations in operational aggregates. For this series of tests, the single classification analysis of variance was predominately used.

Following the identification of variables, which, taken individually, were found to be related significantly to variations in operational aggregates, additional research designs were formulated to identify a combination of variables pertaining to the school and community, which, taken collectively, accounted for the maximum

proportion of variance in the operational aggregates. Here, correlation and multiple regression statistical methods were used.

The correlation and multiple regression analyses were based on the data from one dependent variable, the operational aggregate, and nineteen independent variables. These independent variables included the material resource items for which hypotheses were rejected at the 5 per cent level of significance or greater, together with additional selected variables for which additional tests were desired. The variables included: [10]

Facilities

1. Classroom facilities
2. Shop facilities

Teaching Materials

3. General reference materials
4. Technical reference materials
5. Teaching outlines
6. Audio-visual aids

Equipment

7. Classroom equipment
8. Small tool equipment
9. Large tool equipment

Auxillary Services Resources

10. Counseling services
11. Testing program

Special Service Resources

12. Use of community talent and agencies

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10 The number preceding each variable is designated the variable number, and is used in this section to identify the variable.

Other Variables

13. Guidance personnel

14. Supervisory personnel

15. Number of industrial education teachers

16. Assessed valuation per enrolled pupil

17. Type of program

18. Average salary of teachers

19. Size of school

Correlations Between Dependent and Independent Variables

As the initial step in the multiple regression sequence, the dependent variable was correlated with each of the independent variables. The ratings assigned on Form 10A [11] were used as the values for the independent variables for the first twelve items (Variables No. 1-12). The data for Variables Nos. 13, 14, 15, and 17 were obtained from Form 2, the General Survey Form.[12] For the three remaining items (Nos. 16, 18, and 19), the actual figure--either the assessed valuation per enrolled pupil measured in dollars per pupil, the average annual salary of all teachers in the school corporation measured in dollars, or the number of students enrolled in the high school--were used.

Table XII-61 shows the product moment correlation coefficient for each variable ranked in order of magnitude of the coefficients. The data in Table XII-61 show that correlation coefficients ranged from .059 for assessed valuation per enrolled pupil (Variable No. 16) to .660 for adequacy of general reference material (Variable No. 3). With few exceptions, the correlation coefficient was highest for variables pertaining to adequacy of equipment and teaching materials.

Intercorrelations Between Independent Variables

Preparatory to beginning the multiple regression computations intercorrelation between the nineteen independent variables was determined.

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11 See infra, pp. A-57 ff.

12 See infra, pp. A-1 ff.

TABLE XII-61

PRODUCT MOMENT CORRELATION COEFFICIENTS BETWEEN OPERATIONAL AGGREGATES AND NINETEEN CLASSIFICATION VARIABLES

Variable Rank	Variable No.	Item	r	Table	P
1	3	Adequacy of general reference materials	.660	XII-25	.001
2	4	Adequacy of technical reference materials	.648	XII-26	.001
3	9	Adequacy of large tool equipment	.609	XII-24	.001
4	6	Adequacy of audio-visual aids	.582	XII-27	.001
5	12	Use of community talent and agencies . .	.581	XII-33	.001
6	5	Adequacy of teaching outlines	.566	XII-28	.001
7	8	Adequacy of small tool equipment	.532	XII-23	.001
8	17	Type of program	.466	XII- 3	.001
9	2	Adequacy of shop facilities	.438	XII-21	.001
10	7	Adequacy of classroom equipment	.436	XII-22	.05
11	19	Size of school	.409	XII- 3	.01
12	13	Supervisory personnel in industrial educ.	.366	XII-11	.001
13	15	Number of teachers of industrial education	.361	XII-14	.001
14	18	Average salary of teachers	.354	XII- 6	.01
15	10	Adequacy of counseling services	.346	XII-30	.05
16	1	Adequacy of classroom facilities	.341	XII-20	.05
17	11	Adequacy of testing program	.312	XII-29	.05
18	14	Employment of specialized guidance person	.306	XII-13	.05
19	16	Assessed valuation per enrolled pupil . .	.059	XII- 5	NS

These intercorrelation coefficients are shown in Table XII-62. Except in instances where the independent variables are interrelated, the coefficients, generally, are not high. The coefficient between classroom facilities (Variable No. 1) and classroom equipment (Variable No. 7), for example, is .84. And the coefficient between general reference materials (Variable No. 3) and technical reference materials (Variable No. 4) is .79. At the other extreme, the coefficients between assessed vaulation per enrolled pupil (Variable No. 16) and the other independent variables were uniformly low, with only one coefficient exceeding .25.

TABLE XII - 62

INTERCORRELATIONS OF NINETEEN INDEPENDENT VARIABLES FOR INDUSTRIAL EDUCATION

Variable No.	Variable Number																		Variable No.
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	
1		.48	.34	.33	.31	.12	.84	.23	.24	.06	.16	.05	.02	.00	-.08	.05	.07	.00	-.02	
2			.26	.20	.14	.20	.42	.40	.46	.01	-.06	.14	.11	.17	.14	.18	.09	.30	.19	1
3				.79	.61	.68	.55	.53	.53	.39	.41	.53	.45	.36	.41	.19	.40	.29	.41	2
4					.62	.66	.45	.57	.55	.41	.48	.48	.39	.35	.35	.21	.43	.31	.36	3
5						.47	.36	.49	.40	.45	.53	.41	.26	.24	.25	.11	.37	.20	.26	4
6							.35	.64	.59	.44	.38	.53	.42	.37	.50	.12	.39	.35	.45	5
7								.32	.37	.17	.25	.23	.16	.09	.09	.04	.14	.14	.13	6
8									.72	.34	.30	.43	.44	.44	.49	.20	.44	.51	.50	7
9										.43	.37	.50	.41	.42	.46	.18	.41	.46	.51	8
10											.79	.30	.32	.38	.30	-.04	.16	.31	.35	9
11												.20	.25	.28	.19	.01	.08	.20	.22	10
12													.36	.26	.40	-.06	.53	.25	.37	11
13														.73	.73	.19	.52	.73	.78	12
14															.69	.24	.46	.72	.71	13
15																.09	.59	.67	.89	14
16																	.12	.42	.04	15
17																		.42	.53	16
18																			.72	17
19																				18
																				19

The Analysis of Data by Multiple Regression

Starting with the correlation data shown in Table XII-61, the Wherry-Doolittle technique was applied to identify one possible combination of variables which accounted for a relatively large proportion of the variance of the operational aggregates.[13] Variable No. 3, adequacy of general reference materials, for which the correlation coefficient was .660, offered the most in prediction of the dependent variable. This variable, therefore, was chosen for the initiation of the multiple regression process. The results of the approximations by application of the Wherry-Doolittle technique are shown in Table XII-63. Variables were selected and added to the previously chosen predictors until the increase in R^2, the proportion of the variance of the operational aggregates attributable to the predictors, became less than .01. In all, seven variables were selected, which, in combination, gave an R^2 value of .63940.

TABLE XII-63

INCREASE IN PREDICTION OF SEVEN VARIABLES
BASED ON WHERRY-DOOLITTLE APPROXIMATIONS

Variable number	Variable	Cumulative R^2	d	P
3	Adequacy of general reference materials	.43608		
9	Adequacy of large tool equipment	.52818	.09210	.001
5	Adequacy of teaching outlines	.55821	.03003	.05
2	Adequacy of shop facilities	.59220	.03399	.05
13	Use of community talent and agencies	.61863	.02643	.05
4	Adequacy of technical reference materials	.63120	.01257	NS
16	Assessed valuation per enrolled pupil	.63940	.00820	NS

The differences between R^2 for m variables and R^2 for (m - 1) variables was tested by an F test as each successive predictor was added.[14]

[13] W.H. Stead, C.L. Shartle, et.al., Occupational Counseling Techniques (New York: American Book Co., 1940), pp. 245-52.

[14] J.P. Guilford, Fundamental Statistics in Psychology and Education (Third edition; New York: McGraw-Hill Book Co., Inc., 1956), p. 400.

By the addition of the second predictor, Variable No. 9, adequacy of large tool equipment, to the initially selected predictor, Variable No. 3 adequacy of general reference materials, the value of R^2 was increased from .43608 to .52818. This increase was highly significant, with $P < .001$.[15] The addition of Variable No. 5, adequacy of teaching outlines, increased R^2 to .55821, an increment significant at the 5 per cent level. The addition of Variable No. 2. adequacy of shop facilities increases R^2 to .59220, an increase also significant at the 5 per cent level. The addition of Variable No. 12 use of community talent and agencies resulted in an increase of R^2 to .61863, again significant at the 5 per cent level. The addition of the other two variables, Variables Nos. 4, adequacy of technical reference materials, and 16, assessed valuation per enrolled pupil, failed to result in significant increases in R^2, either singly or collectively. The addition of the six predictors (Variables Nos. 9,5,2, 12,4, and 16) to the initially selected predictor gave an increase of R^2 significant at the .1 per cent level, and the addition of the last five variables (Variables Nos. 5, 2, 12, 4, and 16) to the first two variables (Variables Nos. 3 and 9) gave an increase significant at the one per cent level.

In summary, correlation and multiple regression techniques were applied to identify one possible combination of variables which accounted for a large proportion of the variance of the operational aggregates. For the nineteen variables selected for further statistical treatment, correlation coefficient with the dependent variable ranged from .059 to .660. The Wherry-Doolittle technique was used to determine a combination of predictors which accounted for a large proportion of the variance of the operational aggregates. The predictor pertaining to adequacy of general reference material was determined to be the best single predictor on the basis of correlation with the dependent variable. The addition of the predictor adequacy of large tool equipment gave a highly significant increase in the proportion of variance accounted for by regression. The addition of three other variables yielded increases in R^2 each significant at the 5 per cent level. A combination of seven predictors accounted for 63.94 per cent of the variance of the operational aggregates.

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[15] When added separately to Variable No. 3, Variables Nos. 2 and 12 gave increases significant at the one per cent level; and Variables Nos. 4, 5, 6, 8, and 17 gave increases significant at the 5 per cent level.

SUMMARY OF CHAPTER XII

Operational aggregates, measures of operational emphasis and effort of instructional programs qualified by values of program purposes, were determined for programs of industrial education in a 75 school sample. Derivation of the operational aggregate measure was made in light of current social, economic, and technical trends. Therefore, differences in operational aggregates among programs are indicative of the extent to which the programs reflect societal conditions and trends. It was readily apparent by the great range between the high and low scores and the differences among scores that considerable variability typified the pattern of operations of the industrial education programs. If the operational aggregate scores for the 75 programs were plotted graphically, the result would approximate a normal curve, thus, a normal distribution. Differences in the scores as well as distance and direction from the mean and/or median, in a comparative and relative sense, suggested the extent to which each program investigated reflected societal conditions and trends. In this regard, if the schools were placed on a continuum, the school with the low program operational aggregate (214) disclosed little evidence of performing instructional operations consistent with societal conditions and trends. Correspondingly, as the schools are ordered on the continuum, the greater was the liklihood that instructional operations were such that the areas of emphasis and the nature of effort was consistent with societal conditions and trends; with the program receiving the highest operational aggregate (918) most representative in this respect.

Determination of operational aggregates portrayed a picture of what is now the status of instructional programs of industrial education in relation to societal conditions and trends. Although important, this knowledge has limited value in planning the means to improve program operations in an effort to more realistically reflect societal conditions and trends. This being true, a more fundamental use was made of the operational aggregate measure in this study. It became a dependent variable used as a basis for identifying clues to why differences may have existed among instructional programs. With the operational aggregate serving as dependent variables, a series of analyses were made to ascertain if differences in this measure were related to a selected number of community, school organization, and resource variables. Where deemed advisable, additional analyses were made to trace variation to its source and to identify whether interaction was evident. Then, too, the operational aggregate served as a dependent variable for application of the multiple regression technique to identify one possible combination of independent variables which approximately accounted for a maximum of the variance in the operational aggregate.

Although the determination of operational aggregates for instructional programs in industrial education were made irrespective of program classification, it was readily apparent, based on statistical evidence, that program classification was an intervening variable of considerable import. In this regard, as a group the programs in schools which offered trade and industrial education in addition to industrial arts tended to operate at higher levels, as determined by the operational aggregate measure, than did schools whose programs were solely of the industrial arts type. This being true, analyses were made separately for the sub-populations of the 19 combination type programs and the 56 industrial arts only programs as well as for the total population of 75 industrial education programs. It is important to note several basic organization differences that existed between the typical trade and industrial education class and the typical industrial arts class. These were: (1) Whereas trade and industrial education generally was considered specialized instruction, industrial arts generally was considered exploratory instruction, (2) Whereas the trade and industrial education class typically was organized on the three period block of time basis, the industrial arts class typically was organized on the single period class basis, and (3) Whereas the typical trade and industrial education class tended to accommodate a clientele with special interest and commitment, the typical industrial arts class tended to accommodate a clientele with a wide range of interest and commitment. These variations in program organization within the field of industrial education are summarized as potential cause-effect variables that should be recognized in making interpretations based on the findings reported in this chapter. It is important to note also that as industrial arts programs approached the organizational patterns common to trade and industrial education (e.g. the more specialized, unit shop instead of general shop) the programs tended to operate at higher levels.

Several community variables were identified with differences in operations of industrial education programs. Two of these variables, size of school and rural-urban complexion of the student body, had a somewhat circuitous relationship with operational aggregates. It was previously stated that programs classified as both industrial arts and trade and industrial education tended, as a group, to operate at higher levels than did the industrial arts only group of programs. A high proportion of the trade and industrial education programs were found in large high schools and in schools which enrolled a highly urban student population suggesting that these variables were indirectly related to operational aggregates. That is, as schools became larger and enrolled a considerable number of urban pupils, the greater was the liklihood that trade and industrial education courses would be available, which, in turn, increased the liklihood that the operational level would be high.

A third community variable related to program operations was financial status of the school district as determined by financial ability and financial effort. It was found that financial potential was not highly related to program operations in industrial education. Rather, it was financial effort, the exertion the community made to support education, that the statistical evidence clearly demonstrated was a variable highly related to differences in program operations. In this regard, programs operating at high levels tended to be identified with communities that displayed evidence of making the more pronounced efforts to support education. Furthermore, financial effort was not found to be a function of financial ability.

Geographic location of the school system in the state, a fourth community variable, was not found to be related to operational aggregates of industrial education programs.

Evidence also was disclosed to show that certain school organization variables were identified with differences in the operational measures of industrial education programs. The findings were such that where a relationship existed between school organizational variables and operational aggregates, the connection was somewhat indirect. It was found that programs operating at the higher levels tended to be in high schools (1) that employed two or more teachers of industrial education, (2) that employed directors of vocational education, and (3) that had available full time guidance personnel. In that the situations where these personnel requirements generally were evident were the large high schools, which, in turn, tended to offer trade and industrial education in addition to industrial arts, the relationship cannot be considered apart from, but more probably incidental to, size of school, and, concomitantly, program classification.

Within the organizational patterns for teaching, such teaching load factors as class size, pupil contacts, and periods taught were related to operational aggregates of industrial education instructors. Although the proportion of teachers who taught six or more periods was higher for the instructors of trade and industrial education than for the instructors of industrial arts, the typical trade and industrial education instructor had smaller classes and fewer pupil contacts than did the typical industrial arts instructor. Be this as it may, there was little evidence found to suggest that variations in teaching load were related to differences in operational aggregates of industrial education teachers. Of the teaching load factors studied, only in the case of pupil contacts was there found to exist a high relationship with operational aggregates. Here, the greater the number of pupil contacts, the more likely the operational measure, comparatively speaking, would be low. In this respect, the variations were most prevalent for teachers of trade and industrial education.

The nature of subject offerings and the classification of teachers on the basis of teaching assignment were determined as being school organization variables related to program operations. There was greater liklihood that instructional programs in the specialized areas operated at higher levels than instructional programs in general shop. One exception, however, to this general pattern was the special area of woodworking which programs tended to operate at relatively low levels, as measured by the operational aggregate. Within the specialized areas, the instructional programs in the fields of electricity and electronics (included in the "other" category of Table XII-19) tended to operate at the highest levels. There also was greater liklihood that teachers of trade and industrial education subjects only than either teachers of industrial arts only or teachers of both fields would perform at higher operational levels.

When membership per se in the North Central Association of Colleges and Secondary Schools, as a school organization variable, was compared to variations in operational aggregates, no evidence was disclosed to indicate a high relationship existed.

The findings reported in this chapter clearly demonstrated that the availability and suitability of resources for industrial education programs had an impact on program operations. The more adequate the classroom and shop facilities and equipment, the greater were the odds that the programs would be operating at higher levels than in situations where these resources were found to be inadequate. This same relationship prevailed for such teaching materials as library references, audio-visual aids, and teaching outlines. The auxiliary service where adequately provided for industrial education programs in the areas of guidance testing and counseling increased the chances that the programs were operating at higher levels than where these services were found to be inadequate. Such auxiliary services as student transportation for field trips and teacher travel were not found to be variables highly related to program operations. In this regard, the provisions were inadequate in a high proportion of schools. It should be noted, however, that a significantly higher proportion of schools offering trade and industrial education were rated adequate for student transportation than schools offering industrial arts only.

The findings reported in this chapter warrant concluding that making use of such special service resources as community talent and agencies and student organizations to implement program operations was not common practice in industrial education. Although generally true, there was evidence disclosed to indicate that greater use was being made of community talent and agencies by the teachers of trade and industrial classes than the teachers of industrial arts. Then, too, there was evidence which clearly established that the programs that tended to make greater use of community resources also tended to operate at high levels.

It was found that certain characteristics identified with industrial education teachers were related to the operational emphasis and effort put forth instructionally. The odds that higher levels of operation would be evident favored the teachers with advanced training, previous teaching and trade experience, and tenure. These qualification characteristics were more discriminating as related to levels of operation of industrial arts teachers than they were for teachers of trade and industrial education.

Additional evidence concerning advanced education showed that teachers who had pursued study in certain subject areas increased the odds that this fact would be related to higher levels of operation. Particularly was this true where teachers had pursued course work beyond the bachelors degree in the fields of (1) general engineering, (2) advanced shop training, (3) industrial management, (4) educational guidance, and (5) industrial education. Where industrial arts teachers were considered apart from the total group of teachers, it was found that advanced work in industrial education was the field most associated with high levels of operation. And for teachers of trade and industrial education, it was advanced study in the fields of general economics and industrial management. It should be noted that relatively few teachers had pursued work in several of the fields of study investigated which may explain why a significant relationship with operational aggregates was not found to exist.

There also was some evidence disclosed indicating that if teachers believed they were competent in certain subject areas this judgment tended to be associated with higher levels of operation. In seven of the ten subject areas where teacher opinion of competency was solicited, a high relationship with the operational measure was evident. Where industrial education teachers indicated their competency was adequate in the fields of (1) related science, (2) general engineering, (3) sociology, (4) general economics, (5) industrial management, (6) shop mechanics, and (7) industrial education, there was a greater chance that the operational aggregate measure would be higher for these teachers than for teachers who indicated their competency was inadequate. Here again, the opinion estimates were more discriminating as they pertained to industrial arts teachers than to trade and industrial teachers. It should be noted that in two areas, related science and shop mechanics, there was a significantly greater proportion of trade and industrial teachers than industrial arts teachers who believed they were adequately competent.

Of the community, school organization, and material resource variables found to be related to program operations, it was determined that the adequacy of teaching materials and equipment and the use of community resources correlated highest with operational aggregates. However, the relationship of these independent variables, one with the

others, were not too pronounced. Except where a logical association existed, such as between classroom facilities and classroom equipment, the intercorrelations were relatively low.

By multiple regression, a combination of seven independent variables, from an original list of nineteen variables, was identified which accounted for 63.94 per cent of the variance of the operational aggregates. The specific list of variables identified included the adequacy of general reference materials, large tool equipment, teaching outlines, shop facilities, and technical reference materials; the extent of use of community talent and agencies; and assessed valuation per enrolled pupil. These predictors, it should be pointed out, represented only one combination of variables which, taken collectively, could account for a relatively large proportion of the variance of the operational aggregates.

To the extent that the industrial education programs in the 75 school sample typify the total population of programs, and in accord with the conceptual design and research procedures of the study, the findings of this chapter point to the following generalizations concerning program operations in industrial education:

(1) Programs of industrial education vary greatly in the extent to which their operations are consistent with societal conditions and trends.

(2) The organizational structure that typifies trade and industrial education provides an operational potential that has certain advantages not typically found in the organizational structure of industrial arts.

(3) The large high school and the school serving urban population are environmental factors related to the offering of trade and industrial education programs.

(4) There is a direct relationhsip between community effort to support education and the level of program operation in industrial education, with high financial effort tending to be associated with high program operations.

(5) The availability and suitability of educational resources and the use made of community talent and agencies to augment instruction are highly related to program operation, and one combination of five variables related to resources and the use of community talent and agencies variable accounted for 63.12 per cent of the variance of the operational measure.

(6) The well qualified teacher, based on training and experience and advanced study being pursued in both professional and technical areas, with confidence concerning professional and technical competence,

is more likely to operate at higher levels than the teacher not possessing these qualifications and not expressing professional and technical competence.

(7) Possibly growing out of the fact that trade and industrial education has certain organizational advantages not inherent to the organizational structure of industrial arts, training and experience are more important prerequisites to high level operations for industrial arts teachers than for trade and industrial education teachers.

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CHAPTER XIII

EDUCATIONAL RESOURCES FOR INDUSTRIAL EDUCATION AND THEIR RELATIONSHIP TO COMMUNITY AND SCHOOL VARIABLES

Resources for education provide the means for expediting, facilitating, and aiding the teaching-learning activities. Data reported in the previous chapter indicated that a high relationship existed between the availability and suitability rating of many educational resources and the operational emphasis and effort measure of industrial education programs. It was found that the high measures of operation generally were associated with the high ratings of resources. Major attention in this chapter is directed to the problem of determining whether variations in the ratings of industrial education resources were dependent upon selected community and school variables.[1] As an important corollary to this study, information relative to the community-school variables that are identified with the adequate provision of suitable resources should prove helpful in suggesting the community-school structure that is likely to provide suitable resources which, in turn, will expedite and facilitate program operations.

Chapter XIII describes the provision and condition of resources as appraised for 75 industrial education programs and elaborates on the results of statistical tests which were made to ascertain the relationship between availability-suitability ratings of resources and selected community-school variables.

I. THE APPRAISAL OF INDUSTRIAL EDUCATION RESOURCES

The 75 schools that offered programs of industrial education were visited by members of the research staff, and the resources were appraised using the instrument entitled Industrial Education: Appraisal of Resources (Form 10) which appears in Appendix A of this report. Depending on the nature of the resources, the appraisal was made either on the basis of adequacy or on the basis of the extent of use. A four point rating scale was employed with response categories ranging between 1, indicating "very inadequate" or "used little", and 4, indicating either "very adequate" or "used extensively". In addition to the appraisal of material resources as recorded

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[1] The objective listed in Section III of Chapter I, treated in Chapter XIII, is:

(10.) To ascertain the relationship between human and material resources provided to operate programs of industrial education, and selected community and school variables.

on Form 10, descriptive and opinion data concerning teacher qualifications and assignments were secured from the industrial education instructors. These data were reported on an instrument entitled Industrial Education Teachers: Self Analysis Inventory (Form 4), which also appears in Appendix A.

This section of Chapter XIII gives an account of the provision and condition of industrial education resources. Table XIII-1 summarizes resource appraisal data pertaining to (1) the adequacy and extent of use ratings accorded material resources, and (2) the education and experience characteristics of industrial education instructors.

Ratings Accorded Material Resources

Data reported in Table XIII-1 show the per cent of schools accorded the various adequacy ratings (Part A) and accorded the various extent of use ratings (Part B) of the material resources appraised for programs of industrial education. The "very inadequate" column of Part A and the "used little" column of Part B include, in addition to the proportion of schools assigned these ratings for resources, the schools where the resource was either not available or not used. For the purposes of this study, the ratings of specific resources for specific areas of instruction and of the detail pertaining to each resource as recorded on Form 10, were analyzed further to determine the overall school ratings that were then assigned to the general resource categories as reported in Table XIII-1.[2]

Industrial education classrooms, laboratories, and shops were appraised as to area, use of space, layout, location, and five environmental factors (e.g. aesthetic, thermal, visual, safety, and functional) to arrive at an overall school rating for each of these facilities. Because so few schools had available laboratory facilities for industrial education, the ratings for laboratories were not included in Table XIII-1 (Part A).

It may be observed from the data pertaining to ratings accorded to industrial education classrooms and shops that 77 per cent of the classrooms and 59 per cent of the shops were rated either somewhat inadequate or very inadequate. In that very few schools in the sample had available separate classrooms for industrial education use, the usual practice was to carry on classroom activities in the shops or to use the mechanical drawing room for classroom purposes. Although the mechanical drawing rooms had

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[2] See Form 10A, Analysis of Resources: Industrial Education, infra, pp. A-57 ff.

TABLE XIII-1

RESOURCES APPRAISED FOR INDUSTRIAL EDUCATION PROGRAMS IN SEVENTY-FIVE SCHOOLS, RELATIVE TO ADEQUACY (PART A) AND EXTENT OF USE (PART B), AND RELATIVE TO QUALIFICATION CHARACTERISTICS OF TEACHERS (PART C), SHOWING PER CENT IN EACH CATEGORY

	Rating Categories			
	Adequacy Ratings of Resources			
Resource Items	Very inadequate (Per cent)	Somewhat inadequate (Per cent)	Somewhat adequate (Per cent)	Very adequate (Per cent)
PART "A"				
Facilities				
Classroom	53	24	11	12
Shop	19	40	21	20
Equipment				
Classroom	56	29	11	4
Small Shop tools	12	28	33	27
Large Shop tools	23	32	29	16
Teaching Materials				
General Reference	40	29	19	12
Technical Reference	25	27	33	15
Teaching Outlines	21	19	45	15
Audio-visual Aids	28	32	33	7
Auxiliary Service				
Guidance (Testing)	42	11	40	7
Guidance (Counseling)	53	16	26	5
Teacher Travel	79	5	11	5
Student Transportation	59	5	24	12

TABLE XIII-1 (Continued)

Resource Items	Rating Categories: Ratings of Extent of Usage: Used little (Per cent)	Used moderately (Per cent)	Used considerably (Per cent)	Used extensively (Per cent)
PART "B"				
Special Resources				
Community Talent and Agencies	88	7	5	0
Directed Experience outside Shop	95	3	2	0
Special Student Organizations	92	3	4	1

Education Items	Education-Experience Characteristics of Teachers: B.S. Degree only (Per cent)	B.S. Degree and course beyond (Per cent)	M.S. Degree only (Per cent)	M.S. Degree and course beyond (Per cent)
PART "C"				
Education				
Educational attainment of teachers	13	36	20	31

Experience Items	2 or fewer Years (Per cent)	3 - 5 Years (Per cent)	6 - 10 Years (Per cent)	11 or more Years (Per cent)
Experience				
Non-school Trade or Industrial Teaching	38	29	17	16
Total Years	15	15	22	48
Present Position	22	23	21	34

adequate potential for classroom use in many schools, many medium and large size schools that employed two or more industrial education instructors had this space scheduled for special use during much of the school day. Thus, the space was not available for general classroom use which accounted for a number of the inadequate classroom ratings. Schools where shop facilities received very or somewhat inadequate ratings, generally, were assigned these ratings because of a variety of shortcomings. However, the most prevalent and underlying shortcoming was the limited area available. This shortcoming, of course, was a limiting factor to proper layout and space utilization.

With the limited provision made for special industrial education classrooms and the inadequate size of many shops, which limited the area available for classroom use, it was axiomatic to find classroom equipment inadequate in a high proportion of the schools (classroom equipment was rated very or somewhat inadequate in 85 per cent of the schools). The provision made for shop equipment was somewhat better as indicated by the proportion of schools receiving either somewhat or very adequate ratings as reported in Table XIII-1. Shop equipment, including hand tools, power tools, precision tools, and heavy equipment, were appraised with special reference to instructional areas[3] where industrial education courses were available in a particular school. When the specific ratings for the specific area or areas of instruction were analyzed to arrive at the general school ratings for small and large shop tools, sixty per cent and 45 per cent of the schools were accorded somewhat or very adequate ratings for small and large shop tools, respectively. With few exceptions, it was observed that adequate provision of suitable large shop tools was most likely to be found in schools offering trade and industrial courses and/or schools that operated the industrial arts program on a unit shop basis.

Ratings accorded four types of teaching materials as reported in Table XIII-1 show that fewer than 50 per cent of the schools received ratings indicating adequacy for general reference materials (31 per cent), technical reference materials (48 per cent), and audio-visual aids (40) per cent). However, industrial education instructors were determined as having available adequate teaching outlines in 60 per cent of the schools.

Books, bulletins, periodicals, and other publications related to such general areas as economics, industrial sociology, and industrial psychology were not found to be abundantly available as teach-

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[3] Form 10, Appendix A, shows the fifteen major areas for which shop equipment was appraised. See Infra, pp. A-50 ff.

ing materials for industrial education programs in many schools. Although technical reference materials, generally, were supplied more abundantly than general reference materials for industrial education use, the variety often was found to be limited to relatively few industrial fields. Further, these reference materials in many schools were lacking in depth of content.

Despite the number and variety of projective aids, graphic aids, models, mock-ups, and specimens potentially available, only seven per cent of the 75 schools in the sample were accorded very adequate ratings for industrial education audio-visual aids. Again, where adequacy ratings were accorded schools based on availability and suitability of audio-visual aids, it often was the school organized on the unit shop plan that received the adequacy ratings.

It may be observed in Table XIII-1 (Part A) that such auxiliary service resources for industrial education as guidance testing, counseling, teacher travel allowances, and student transportation provisions were considered by the research staff as being either somewhat or very inadequate in more than one-half of the schools. Even in many of the schools where guidance testing services for industrial education were appraised as being adequate (47 per cent), the equally important and corollary counseling service often was appraised as being inadequately provided. In contrast with vocational agriculture programs where a high proportion of the instructors had adequate budget provisions for the travel made in connection with their work, only 16 per cent of the schools were rated as making adequate budget allocations for travel of industrial education instructors. Then, too, only 36 per cent of the schools had the transportation means available for such instructional related activities as field trips and plant visitations.

In the construction of a resource appraisal instrument for industrial education, it was determined that a special classification of resources to include such things as community talent and agencies, work experience programs, and subject related student organizations should be appraised. These special kinds of resources were rated on the basis of extent of use as summarized for the 75 schools in Table XIII-1 (Part B). It becomes very obvious from a review of the findings reported in the table that these special resources were found to be used little by instructors of industrial education in a high proportion of all schools in the sample.

Education and Experience Characteristics of Industrial Education Instructors

Industrial education instructors indicated, among other

things reported on Form 4, education and experience qualifications. These data are summarized in Part C of Table XIII-1. It may be observed from the data concerning level of educational attainment that a high proportion of the industrial education instructors had pursued course work beyond the requirements for the baccalaureate degree (87 per cent), with slightly over 50 per cent having completed the requirements for the masters degree.[4] It should be noted also that a high proportion of the industrial education instructors had the benefit of non-school trade and/or industrial experience to supplement their formal educational training.

The typical instructor of industrial education courses was an experienced teacher, with 48 per cent having 11 or more years of teaching experience. Relatively long tenure was widespread with 55 per cent of the instructors having taught six or more years in their present positions.

II. THE RELATIONSHIP BETWEEN RESOURCES AND COMMUNITY VARIABLES

By definition, resources were broadly conceived to include both material and human resources. The material resources commonly associated with programs of industrial education, which are considered in this section of this chapter, included the classroom and shop facilities, the instructional tools and equipment, the teaching aids and materials, and other auxiliary service resources. The principal human resource which is considered in this section was the industrial education teacher.

The selected community variables which were investigated in this study included school size, financial ability, geographic location, and rural-urban classification of the student body. These variables were used to make comparisons to determine their relationship to the availability and suitability ratings of resources provided for industrial education.

Relationship Between Material Resources and Community Variables

Data dealing with the comparisons between material resources and given community variables are summarized in Table XIII-2.

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[4] The instructional areas in which graduate work had been pursued and the number of instructors who had pursued work in each of the areas may be found by referring to Tables XII-50.

TABLE XIII-2

RESULTS OF STATISTICAL TESTS OF THE RELATIONSHIP BETWEEN RATINGS AND CHARACTERISTICS OF RESOURCES OF SEVENTY-FIVE INDUSTRIAL EDUCATION PROGRAMS, AND FOUR COMMUNITY VARIABLES, SHOWING PER CENT OF RESOURCES RATED ADEQUATE (PART A) OR USED CONSIDERABLY (PART B), AND FOR GIVEN EDUCATION-EXPERIENCE OF TEACHERS (PART C)

	Community Variables*															
	School Size				Financial Ability				Geographic Location					Census Make-up			
	S	M	L	P**	L	M	H	P**	N	NC	SC	S	P**	R	M	U	P**
Resource Items	%	%	%		%	%	%		%	%	%	%		%	%	%	
PART "A"																	
Facilities																	
Classroom	43	23	8	1	17	33	21	-	15	33	24	23	-	36	26	13	-
Shop	33	42	46	-	33	33	58	-	42	53	29	46	-	29	45	43	-
Equipment																	
Classroom	14	23	8	-	10	23	17	-	8	20	14	23	-	14	23	7	-
Small tools	33	50	89	.1	57	52	71	-	73	53	57	46	-	29	52	83	1
Large tools	10	46	71	.1	37	38	63	-	58	40	38	38	-	86	42	63	1
Teaching Materials																	
General Ref.	14	23	50	5	20	24	50	5	31	20	29	46	-	14	26	43	-
Technical Ref.	38	31	71	1	37	48	63	-	58	48	32	54	-	36	29	63	-
Teaching Outlines	57	50	71	-	63	62	67	-	58	53	57	77	-	50	58	67	-
Audio-visual Aids	10	31	71	.1	37	39	46	-	46	27	38	46	-	7	29	67	.1
Auxiliary Services																	
Guidance-testing	29	54	54	-	47	62	33	-	50	40	33	46	-	36	39	60	-
Guidance-couns'g	19	31	39	-	33	38	21	-	39	27	29	23	-	29	26	37	-

TABLE XIII-2 (Continued)

Resource Items	Community Variables															
	School Size				Financial Ability				Geographic Location					Census Make-up			
	S	M	L	P	L	M	H	P	N	NC	SC	S	P	R	M	U	P
	%	%	%		%	%	%		%	%	%	%		%	%	%	
PART "B"																	
Special Resources																	
Community Talent and Agencies	0	4	11	-	0	5	13	-	4	0	3	15	-	0	7	7	-
PART "C"																	
Education of Teachers																	
Masters Degree with Courses Beyond	14	16	37	.1	21	31	38	5	33	23	22	43	-	21	22	36	2
Experience of Teachers																	
6 or more years of trade or industry	15	25	39	.1	23	34	41	-	39	20	31	40	-	14	31	37	1
11 or more years of teaching	48	34	53	-	40	54	50	-	52	40	47	51	-	43	38	54	-
11 or more years of tenure, Present job	19	18	40	5	28	39	33	5	36	23	33	40	-	21	22	41	-

*Community Variables: (1) School Size -- S=Small, 100-150 pupils, grades 9-12; M=Medium, 300-450 pupils, grades 9-12; and L=Large, 600 or more pupils, grades 9-12. (2) Financial Ability (assessed valuation per pupil) -- L=Low, $7000.00 and under; M=Medium, $7001.00 to $9000.00; H=High, over $9000.00. (3) Geographic Location (in Indiana) -- N=North; NC=North Central; SC=South Central; and S=South. (4) Census Make-up -- R=Highly Rural student population; U=Highly Urban student population; and M=Mixed Rural-Urban population.

**Probability

Classroom and shop facilities. Results of tests of significance applied to the relationship between ratings of facilities provided for industrial education programs and the given community variables are reported in Part A of Table XIII-2. Eight null hypotheses to the effect that classroom and shop facilities were independent of (1) school size, (2) financial ability, (3) geographic location, and (4) rural-urban classification were tested using the chi-square test of independence in contingency tables.

With one exception, the null hypotheses were found to be tenable. The exception being the relationship between adequacy ratings of classroom facilities and school size; here a significant difference at the 1 per cent level of significance was found. When observing this phenomena, it may be seen that the difference was due, in part, to the high proportion of inadequate ratings given to classrooms in the large size schools included in the sample.

The data collected and tested in this study suggest that such community variables as financial ability, geographic location, and rural-urban classification were not significantly related to ratings assigned to classroom facilities. Then, too, it was found that none of the community variables studied had a significant bearing upon the ratings given to industrial education shop facilities.

Classroom and shop equipment. In Part A of Table XIII-2, the test results for determining the relationship between ratings of equipment provided for the industrial education programs and the community variables are reported. In this instance, the chi-square test of independency was applied to test 12 null hypotheses to the effect that availability-suitability ratings assigned classroom and shop equipment were independent of the given community variables.

The four null hypotheses which tested the relationship between ratings of classroom equipment and the given community variables were found to be tenable at the chosen level of significance. It should be emphasized again that, in general, the ratings given classroom equipment were below average for a decided proportion of the schools represented in the sample.

Two community variables were found to have a significant relationship to the ratings given to small tool equipment in the shops. Similarly, the same variables were found to be significantly related to ratings assigned to the large tool equipment in the shops. The null hypotheses to the effect that ratings of small

and large tool equipment were independent of school size were rejected at the .1 per cent level of significance. The null hypotheses related to rural-urban classification and small and large tool equipment, likewise, were rejected, and in these instances, at the 1 per cent level of significance. Observation of these data shows that a high proportion of the schools classified as large and as enrolling student bodies classified as urban tended to receive adequate ratings for their large and small tool equipment. Upon examination of findings based on this sample, it is possible to generalize that as schools diminish in size and the student bodies become rural in character, the greater the likelihood that industrial education shop equipment will be rated as inadequate.

Finally, it should be pointed out that the null hypotheses formulated to test the relationship between shop equipment (large and small) and (1) financial ability and (2) geographic location were found to be tenable.

Library and teaching aid materials. Data used to determine the relationship between ratings of library materials provided for industrial education programs and the four community variables also are summarized and test results are reported in Part A of Table XIII-2. Tested were eight null hypotheses to the effect that the availability and suitability ratings of general and technical library reference materials were independent of the given variables.

Three of these hypotheses were rejected at the 5 per cent, or greater, level of significance when tested by application of the chi-square statistical technique. It was found that school size had a significant bearing upon the rating of availability-suitability of general and technical library reference materials. In this regard, it was found that industrial education programs receiving adequate ratings for library materials were proportionately greater in the large high schools. According to the findings, financial ability as measured by assessed valuation per pupil, was related significantly to the availability-suitability ratings of general reference materials. From the results of statistical tests of these data, it was found that geographic location of schools and rural-urban classification of student bodies were not significantly related to the availability-suitability ratings of library reference materials. Although the differences were not found to be statistically significant, the pattern of adequate ratings of library reference materials tended to favor the high schools classified as serving urban student populations.

When the data regarding the availability-suitability ratings of library reference materials for all the schools in the sample are reviewed, it can be observed that industrial education programs

apparently were not being adequately supported with library reference material needs.

The data in Part A of Table XIII-2 show that there were no statistically significant differences evident when the chi-square test of independence was applied to determine the relationship between ratings accorded teaching outlines and the variables considered. It can be observed, however, that a greater proportion of adequate ratings given availability-suitability of teaching outlines favored the industrial education programs in large high schools and schools characterized as enrolling an urban student population.

When the null hypotheses to the effect that ratings assigned the availability-suitability of audio-visual aids were independent of the designated community variables were tested, the hypotheses pertaining to school size and rural-urban classification of student body were each rejected at the .1 per cent level of significance. It appears reasonable from an analysis of these data to conclude that the large high schools and high schools serving urban student populations are more apt to make adequate provision of audio-visual aids than small high schools and schools serving a rural student population.

Auxiliary service resources. Table XIII-3 (Part A) presents data showing the relationship between ratings of auxiliary service resources (counseling service, guidance testing service, and use of community resources) provided for industrial education programs and given community variables. The statistical test applied to determine extent of relationship did not disclose any evidence to suggest that school size, financial ability, geographic location, or rural-urban classification of students were variables influencing the availability-suitability ratings of auxiliary service resources. It is important to note that auxiliary service resources, as defined in this study, were found to be rated inadequate for the majority of the programs analyzed in the 75 school sample.

Special resources. As Part B of Table XIII-2, the data are summarized and test results reported pertaining to use of special resources. It may be observed from the results of the test of significance that no evidence was disclosed to suggest that use of community personnel and agencies, as a special resource, was significantly related to any of the community variables selected for study. However, it is important to note that very few schools had industrial education instructors who made considerable use of community personnel and agencies as a special resource.

Relationship Between Human Resources and Community Variables

The data in Part C of Table XIII-2 report the results of tests applied to determine the relationship between the qualifi-

cations of industrial education teachers and the given community variables.

Four null hypotheses were tested to the effect that the type of college degrees held by industrial education teachers were independent of the selected community variables. These tests disclosed statistical evidence, as reported in Part C of Table XIII-2, that school size, financial ability, and rural-urban classification of the student body were community variables highly related to level of educational attainment as measured by the college training obtained by industrial education teachers. It may be observed from the data that by contrast with all teachers in the sample the proportion of teachers with higher levels of educational attainment were more often employed in large high schools, in schools serving urban pupil populations, and in school systems possessing greater financial ability.

Four null hypotheses to the effect that the years of trade and/or industrial experience of industrial education teachers were independent of the selected community variables were tested. By these tests it was determined that school size and rural-urban classification of student body were variables significantly related to the years of occupational experience (outside of teaching) of industrial education teachers. These data suggest that by contrast with all teachers in the sample the proportion of teachers with three or more years of trade and/or industrial experience were (1) more often employed in the large high schools than in medium and small size schools and (2) more often employed in the schools serving urban pupil populations than in schools classified as serving rural or rural-urban pupil populations.

When examining the relationship between the total years of teaching experience and the four community variables, no statistically significant differences at the selected level of significance were found to exist. Thus, this study did not disclose any evidence to support the notion that the selected variables were related significantly to any given pattern of employment based upon the total years of previous teaching experience. However, statistical evidence was found to exist which supported the generalization that size of school and financial ability were variables that related significantly to length of tenure of teachers in their present positions.

Finally, it should be pointed out that geographical location of high schools was not found to be a community variable which was significantly related to qualifications of teachers of industrial education.

III. THE RELATIONSHIP BETWEEN RESOURCES AND SCHOOL ORGANIZATION VARIABLES

This section of the study sought to determine whether certain school organization variables were highly related to differences in the availability and suitability ratings of resources for industrial education programs of the schools in the sample. Material resources were related to the following school organization variables: program structure, membership in the North Central Association of Colleges and Secondary Schools, and number of industrial education teachers in each school. Human resources were related to selected variables which included program structure, membership in the North Central Association of Colleges and Secondary Schools, and structure for administration of vocational education.

Relationship Between Material Resources and School Organization Variables

Table XIII-3 (Part A) summarizes data and reports test results which indicate the relationship between material resources and the given school organization variables.

Classroom and shop facilities. Results of the applications of the chi-square test of independence in contingency tables, as reported in Part A of Table XIII-3, did not disclose any statistical evidence to suggest that ratings of classroom and shop facilities were significantly related to the given school organization variables. It may be noted that a high proportion of all the schools in the sample had their shop classroom facilities rated inadequate.

Classroom and shop equipment. Part A of the table reports findings that indicate school organization variables were not significantly related to the ratings given to the classroom equipment provided for industrial education program for schools in the sample. However, there were significant differences found between the ratings of small and large tool equipment and certain of the given variables. Membership in the North Central Association and the type of program structure were variables that were found to be highly related to the ratings obtained for the availability and suitability ratings of large tool equipment. From observation of the data, it may be generalized that where significant differences occurred, the adequacy ratings of equipment favored industrial education courses, in schools with North Central approval, and in schools employing five or more instructors.

Library and teaching aid materials. In Part A of Table XIII-3, the findings related to general and technical library resources are reported. No statistical evidence was disclosed that

TABLE XIII-3

RESULTS OF STATISTICAL TESTS OF THE RELATIONSHIP BETWEEN RATINGS AND CHARACTERISTICS OF RESOURCES OF SEVENTY-FIVE INDUSTRIAL EDUCATION PROGRAMS AND THREE SCHOOL ORGANIZATION VARIABLES, SHOWING PER CENT OF RESOURCES RATED ADEQUATE (PART A), AND FOR GIVEN EDUCATION-EXPERIENCE CHARACTERISTICS OF TEACHERS (PART B)

	School Organization Variables*									
	Program Structure			North Central Membership			No. of Ind. Ed. Teachers			
Resource Items	I.A. only	I.A. + T.I.		Yes	No		1	2-4	5 or more	
	%	%	pss	%	%	pss	%	%	%	pss
PART "A"										
Facilities										
Classroom	28	5	-	16	38	-	38	10	10	-
Shop	39	47	-	45	25	-	35	43	50	-
Equipment										
Classroom	14	16	-	16	13	-	18	14	10	-
Shop, small tools	50	90	1	69	42	5	35	62	50	-
Shop, large tools	36	74	1	57	21	1	18	57	80	.1
Teaching Materials										
General Ref.	20	63	1	37	17	-	15	29	40	1
Technical Ref.	36	84	.1	53	38	-	32	38	85	.1
Teaching Outlines	52	84	5	67	46	-	56	48	80	-
Audio-visual Aids	27	79	.1	50	17	2	15	48	75	.1
Auxiliary Service										
Guidance testing	36	21	-	35	21	-	24	38	35	-
Guidance counseling	46	47	-	53	33	-	38	57	50	-

TABLE XIII-3 (Continued)

Teacher Characteristics	School Organization Variables*									
	Vocational Direction			North Central Membership			Program Structure			
	Yes	No		Yes	No		I.A. only	I.A.+ I.I.	I. Bl. Vo-Ag.	
	%	%	pss	%	%	pss	%	%	%	pss
PART "g" —										
Education Attainment										
Masters Degree with courses beyond	40	15	.1	32	21	5	29	35	25	-
Experience										
6 or more years of trade & industrial	47	37	-	36	22	-	32	46	20	-
11 or more years of teaching	53	42	-	48	48	-	53	50	40	-
11 or more years of tenure, present job	41	23	-	34	30	-	35	37	27	-

* School Organization Variables: I. Program Structure — (1) I. A. only = industrial arts program only; (2) I.A. + T.I. = trade and industrial education programs in addition to industrial arts; (3) I.Bl. + Vo.Ag. = industrial edmation programs plus vocational agriculture programs. II. North Central Membership — (1) Yes = high school was accredited by North Central Association of Colleges and Secondary Schools; (2) No = high school not accredited. III. Vocational Director — (1) Yes = the school corporation employed a vocational director; (2) No = a vocational director was not employed.

pss Probability.

ratings of library resources were dependent upon membership in the North Central Association of Colleges and Secondary Schools. However, the data revealed that availability-suitability ratings of library resources were dependent upon the type of program structure and the size of industrial education staffs. Again, where statistically significant differences were evident, the proportion of adequacy ratings of general and technical library resource materials favored the industrial education programs where schools offered both industrial arts and trade and industrial education, and in schools employing five or more instructors of industrial education subjects.

Of the three school organization variables studied it was found that the type of program structure variable had a significant relationship to the availability-suitability ratings of teaching outlines. The ratings of audio-visual aid resources were found to be statistically related to the three school organization variables. Where significant differences appeared, the high proportion of adequate ratings were given to the schools that offered both industrial arts and trade and industrial education courses, schools that were members of North Central, and schools employing five or more industrial education teachers.

Auxiliary service resources. In brief, Table XIII-3 (Part A) summarizes the data which suggest that ratings of counseling, guidance service, testing, and the use of community resources, as auxiliary service resources, were not found to be statistically dependent on variations in type of program structure, in North Central membership, or in size of the school's industrial education staff.

Guidance personnel--guidance activities. The data related to the provision for special guidance personnel and availability-suitability ratings of counseling and guidance service testing activities for industrial education programs are reproduced in Table XIII-4. The table discloses from the test results that statistically significant differences occur for the ratings of counseling and guidance service testing activities due to the availability and extent to which special guidance personnel were employed in the schools. It would appear from these data that the adequate ratings of availability-suitability of guidance counseling and testing activities tended to increase proportionately in relation to the extent to which special guidance personnel were available. However, it must be viewed with concern that a relatively high proportion of the schools employing full-time guidance specialists received inadequate ratings on the adequacy of guidance counseling and testing activities as viewed in light of industrial education programs.

TABLE XIII-4

RELATIONSHIP BETWEEN RATINGS ASSIGNED SELECTED GUIDANCE SERVICES AVAILABLE TO INDUSTRIAL EDUCATION INSTRUCTORS AND THE NATURE OF THE GUIDANCE PERSONNEL STRUCTURE, SHOWING RESULTS OF TESTS OF SIGNIFICANCE

	Nature of Guidance Personnel						
	No special personnel		Part-time personnel		Full-time personnel		Chi-square test Result
	Inadequate	Adequate	Inadequate	Adequate	Inadequate	Adequate	
	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	P
Testing	81	19	51	49	34	66	.001
Counseling	86	14	71	29	54	46	.01

Relationship Between Human Resources and School Organization Variables

The factors pertaining to the qualifications of industrial education teachers and their relationship to school organization variables are reported in Part B of Table XIII-3).

When the level of educational attainment of industrial education teachers, as measured by type of college degree held, was tested for its relationship to three selected school organization variables, it was found that significant differences were evident between level of educational attainment and (1) membership in North Central, and (2) structure for administration of vocational education. It is apparent from these data that the higher proportion of industrial education teachers with education beyond the bachelors degree were employed in schools that were than were not accredited by the North Central Association, and in schools which had than had not employed a director or supervisor of vocational education.

The school organization variables used in this study to test relationships with (1) the amount of trade experience, (2) the years of teaching experience of instructors, and (3) the tenure of instructors in their present positions disclosed no statistically significant differences.

IV. THE RELATIONSHIP BETWEEN ADMINISTRATOR BUDGET ADEQUACY RATINGS AND THE ASSIGNED RATINGS OF SELECTED RESOURCES

The administrators of the schools in the sample rated the adequacy of budget allocations for teaching materials and aids, shop equipment, and transportation for field trips for industrial education programs.[5] These ratings were then compared with the ratings assigned to these items by the research staff. In Table XIII-5 data are reported to show the relationship between administrators' judgment of budget adequacies for resources and ratings assigned by the research staff for resource adequacy.

An analysis of the data reported in Table XIII-5 reveals that administrator judgment indicating the adequate financial means had been made to provide resources was not highly related to the adequacy of resources present as determined by the research staff. It may be observed that for each of the resources selected for study a high proportion of the administrators, ranging between 63 per cent in the case of student transportation and 84 per cent in the case of library references and audio-visual materials, had judged budget provisions for resources as being adequate. In contrast, resources were appraised as being adequate by the research staff in fewer than 30 per cent of the schools with the single exception of small tool equipment which had been rated adequate in 57 per cent of the schools.

There was greater likelihood, as may be observed from a study of the data in Table XIII-5 that if administrators judged budget allocations to provide the selected resources as being inadequate, the resources would have been rated inadequate by the research staff. When the various categories of resource ratings are studied, the pattern of response was such that where administrator judgment indicated inadequate budget provisions for resources, resources were rated inadequate in 77 per cent of the ratings.

It may be reasonable to presume that if the school administrator believes adequate financial provisions had been made to provide educational resources, the resources present should be adequate. However, the data reported in Table XIII-5 indicated that under the conditions of this study this presumption in many cases would not have been correct. Thus, to determine if the differences observed were due to chance, six null hypotheses were formulated and tested using the binomial expansion to obtain probabilities from which statistical interpretations of the chance phenomena could be made.

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[5] The administrator ratings were reported on General Information Survey (Form 2) which is reproduced in Appendix A of this report, infra, pp A-1 ff.

TABLE XIII-5

RESULTS OF TESTS OF SIGNIFICANCE MADE OF COMPARISONS BETWEEN ADMINISTRATOR JUDGMENT CONCERNING ADEQUACY OF BUDGET PROVISIONS FOR FIVE SELECTED RESOURCES AND THE ADEQUACY RATINGS ACCORDED RESOURCES BY THE RESEARCH STAFF RATERS FOR INDUSTRIAL EDUCATION PROGRAMS

PART A
COMPARISONS

SELECTED RESOURCES	Administrators judging provisions adequate		Administrators judging provisions inadequate		Per cent judging resource adequate	
	Rated as Adequate N.	Rated as Inadequate N.	Rated as Adequate N.	Rated as Inadequate N.	Admin. %	Raters %
General Reference	22	37	1	10	84	33
Technical Reference	31	28	2	9	84	47
Audio-visual Aids	28	31	3	8	84	44
Small tool Equipment	32	16	7	14	70	57
Large tool Equipment	26	22	4	17	70	43
Student Transportation	20	22	6	19	63	39

PART B
RESULTS OF STATISTICAL TESTS

Resource area	Pairs of observations	Pairs of disagreement	Distribution	Associated Probability	
General Reference	70	38	37-1	.00004	P < .001
Technical Reference	70	30	28-2	.00005	P < .001
Audio-visual Aids	70	34	31-3	.00005	P < .001
Small tool Equipment	69	23	16-7	.09500	P > .05
Large tool Equipment	69	26	22-4	.00080	P < .001
Student Transportation	67	28	22-6	.00620	P < .01

In each instance, the null hypothesis tested was that the median of the differences was zero. That is, there was equal likelihood that where administrators judged budget provisions for resources adequate the research staff rated resources inadequate, as where administrators judged budget provisions inadequate, the staff accorded adequate ratings to resources. Basic data used in testing the hypotheses and the test results are reported in Table XIII-5.

The results reported in the probability column of the table indicate that five of the six null hypotheses tested were rejected at the 1 per cent, or greater, level of significance. Only in the case of the test relating to small tool equipment was it found that the frequency with which differences occurred could be attributed to chance. Tests of the data relating to general and technical library references, audio-visual aids, large tool equipment, and student transportation did reveal statistical evidence that the differences as noted would have occurred by chance in not more than one case out of each 100 cases. Thus, the weight of evidence tends to support a conclusion to the effect that the situation where administrators make judgments relative to budget adequacy for selected industrial education resources, if used as a measure of actual resource adequacy, would not yield similar results as the situation where resources present in the schools are rated by the procedures employed in this study.

SUMMARY OF CHAPTER XIII

The findings previously reported in Chapter XIII showed that a high relationship existed between the availability and suitability ratings of many of the resources and the operations of industrial education programs. Information relative to community and school variables commonly associated with adequacy and use of resources should prove helpful by suggesting the community-school structure identified with making available the suitable resources. Chapter XIII discusses the status of educational resources as they were appraised for industrial education programs and reports results of tests of significance applied to determine the relationship between ratings of resources and (1) selected community variables, (2) selected school organization variables, and (3) administrator judgment of budget provisions for selected resources.

Appraisal of industrial education resources as to provision and condition revealed the following findings:

1. Limited provision was made in many of the schools for special space to carry on activities that typically are performed best in a general type classroom, and the tendency to improvise by setting aside certain special area space, usually the drafting room, for classroom type activities generally did not provide adequate conditions for these activities.

2. In accordance with the appraisal procedures employed to determine the adequacy of school shops in relation to space, layout, location, and general environment, it was determined that shop facilities were inadequate in three out of every five of the 75 schools where these facilities were appraised.

3. Although such shop equipment as hand tools, small power tools, and precision instruments, categorized as small tool equipment, were rated as being adequate in three out of each five schools, the heavy, large tool equipment was appraised as being adequate in fewer than one out of each two schools.

4. Generally speaking, library references for industrial education were appraised as being sub-standard. In the technical areas, the variety of references generally was limited. And for the general areas (e.g. general economics, industrial psychology, and sociology), in most cases there was a dearth of publications.

5. Audio-visual teaching materials such as projective aids, graphic aids, models, mock-ups, and speciments were rated as being very adequate in only one out of each 15 schools.

6. Auxiliary service resources such as guidance testing and counseling, student transportation, and teacher travel were appraised as being inadequate in more than one half of the schools. Of the auxiliary service resources, testing services were the most adequately provided. Provisions for teacher travel were virtually non existent.

7. Limited use was being made by a high proportion of the industrial education teachers of such special service resources as community talent and agencies, work experience programs, and student organizations to implement instruction.

8. Qualification characteristics of industrial education teachers revealed that nine out of each ten teachers had pursued advanced study beyond the bachelors degree, and, typically, had previous teaching and trade experience. Tenure of industrial education teachers was relatively high with more than one out of each two teachers having been employed six or more years in their present position.

The following points summarize the findings in this chapter that tested the relationship between community variables and the ratings of material resources and the qualification characteristics of teachers.

1. The community variables selected for study were not found to be highly related to ratings accorded industrial education shops and classroom; except that size of school was found to be a variable significantly related to ratings assigned classrooms. Here it was found that a higher proportion of classrooms were appraised as being adequate in small schools than the proportion appraised as being adequate in either middle-or large-size schools.

2. When schools were arranged into low, medium, and high groups according to financial ability, as measured by the assessed valuation per pupil in grades 1 through 12, to determine the relationship between financial ability and resources, with the exception of general library references, statistical evidence was not found to indicate that financial ability was a variable highly associated to the adequate provision of material resources.

3. When schools were grouped into small-, medium-, and large-, size classifications to make comparisons with resource ratings, it was found that size was a community variable significantly related to ratings assigned (1) small tool equipment, (2) large tool equipment, (3) general library references, (4) technical library references, and

(5) audio-visual aids. It was found that a greater proportion of large schools received ratings of adequacy for these resources than were assigned to either the small- or medium-size schools.

4. When school were grouped according to the rural-urban classification of the high school student body as being either highly rural, mixed, or highly urban, rural-urban classification was found to be a variable significantly related to ratings assigned (1) small tool equipment, (2) large tool equipment, and (3) audio-visual aids. Here, it was found that a greater proportion of the schools characterized as enrolling an urban student body received ratings of adequacy than were received by the schools in the other groups.

5. The geographic location of schools in the state was not found to be a community variable highly associated to differences in adequacy of resources or in qualification characteristics of industrial education instructors.

6. Of the community variables studied, none were found to have a significant relationship to ratings for such resources as teaching outlines, counseling services, guidance testing services, and use of community resources.

7. When size of school groups served as a community variable to determine if school size was significantly related to the qualification characteristics of industrial education instructors, significant differences were found between school size and (1) educational training of teachers as measured by type of college degree held, (2) amount in years of industrial and/or trade experience possessed by instructors, and (3) tenure in years of industrial education instructors in their present position. A higher proportion of industrial education instructors with advanced training, more years of industrial and/or trade experience and longer tenure in present positions were found in large schools than in either the middle-or small-size schools.

8. When rural-urban classification of the high school student body was used as a basis for grouping schools to test the relationship with qualification characteristics of teachers statistically significant differences were found to exist between rural-urban classification and (1) educational training of teachers as measured by degree held and (2) tenure in years of instructors in their present position. In each of these instances a higher proportion of instructors with advanced training and longer tenure in their present position were found to be employed in schools classified as having a highly urban student body than were found in schools with either mixed or highly rural student populations.

9. Financial ability was found to be a community variable significantly related to such qualification characteristics as (1) educational training of teachers and (2) tenure in years of teachers in their present positions. Schools which had the highest financial ability were the schools that had the greater proportion of teachers with advanced training and longer tenure.

The findings of the tests of significance applied to determine the relationship between school organization variables and ratings assigned resources and qualification characteristics of teachers were as follows:

1. Adequacy ratings assigned industrial education classroom and shop facilities were not found to be highly related to such school organization variables as (1) program structure, (2) membership in the North Central Association of Colleges and Secondary Schools, and (3) number of teachers in a school with teaching assignments in industrial education.

2. Industrial education programs found in schools offering trade and industrial education, affiliated with the North Central Association, and employing five or more teachers were more likely to have adequately equipped shops, adequate library references, and adequate audio-visual aids than schools not meeting these organizational criteria. However, the number of teachers was not a variable associated with the extent of adequacy of small tool equipment, and North Central membership was not found to be related to adequacy ratings of library reference materials. Then, too, of the three school organization variables, only program structure was highly related to the adequacy ratings of teaching outlines.

3. The availability of special guidance personnel in a school system was highly related to the adequacy ratings of guidance testing and counseling services for industrial education. Adequacy ratings for guidance services tended to increase proportionally in relation to the extent to which special guidance personnel was available.

4. Schools affiliated with the North Central Association and employing Directors of Vocational Education were more likely to have employed teachers with post-bachelors degree education than were schools not so affiliated or not employing vocational directors. However, teaching and trade experience and tenure in present position were not related to these organizational variables. Program structure was not found to be a variable highly related to any of the qualification characteristics of industrial education teachers.

When administrator judgment of budget adequacy for selected resources was compared to availability-suitability ratings assigned these resources by the research staff, the pertinent findings were as follows:

1. Whereas a high proportion of the administrators judged budget provisions for teaching materials, shop equipment, and student transportation as adequate, these resources as available and suitable were rated as being adequate in fewer than one half of the schools.

2. The statistical evidence denied (at the accepted level of significance) that the differences noted between administrator judgment of budget adequacy and research staff ratings of adequady for the selected resources could be attributed to chance. In other words, the situation where the administrator judged budgetary provisions for resources as being either adequate or inadequate was not highly related to the situation where the research staff assigned adequacy or inadequacy ratings.

On the basis of the research procedures which resulted in the findings reported in this chapter, and to the extent the programs studied are representative, the following generalizations concerning the relationship between resources for industrial education and community-school organization variables seem apropos:

1. Community variables such as school size, financial ability, geographic location, and rural-urban student population, and school organization variables such as program structure, membership in the North Central Association, and number of industrial education teachers employed tend to make little difference in the adequacy of the facilities provided to house industrial education programs.

2. The community that has a student population to warrant large high school attendance units (schools enrolling 600 or more pupils in grades 9 through 12) generally will provide more adequate material resources for operating industrial education programs, and furthermore, will tend to employ and retain better qualified teachers than will the community that does not meet this size criterion.

3. Although there is limited evidence to suggest that the community possessing adequate financial ability, comparatively speaking, utilizes this ability to provide more adequate material resources for industrial education than the community possessing less adequate financial ability, there is evidence that a greater proportion of the more highly trained teachers will be employed in a community with adequate financial ability than in a community with relatively less financial ability, and, furthermore, will be retained for longer periods of time.

4. The schools organized to offer trade and industrial education in addition to industrial arts, to qualify for membership in the North Central Association, and to employ five or more industrial education instructors generally will be the schools most adequately equipped with material resources for industrial education.

5. The school that is affiliated with the North Central Association and the school that employs a Director of Vocational Education will tend to be the school employing highly trained industrial education teachers.

6. The extent to which specially trained guidance personnel are available to assist industrial education teachers will tend to determine the extent to which guidance services for industrial education are adequate.

7. The judgment of a school administrator that budgetary provisions for industrial education resources are adequate is, generally, not reflected in the adequacy ratings assigned to the resources.

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CHAPTER XIV

THE INTERRELATIONSHIP AMONG PURPOSES, OPERATIONS, AND RESOURCES OF PROGRAMS OF INDUSTRIAL EDUCATION

In Chapters X through XIII, data pertaining to a sample of 75 industrial education programs were analyzed to study (1) the relative importance of the purposes of the program; (2) the operational emphasis and effort being put forth to attain each purpose; (3) the operational aggregate, a measure which links operational emphasis and effort to purposes; and (4) the resources provided to operate programs of industrial education. The present chapter examines the interrelationship among the acceptance of purposes, operational emphasis and effort, and the resources provided to operate the programs.[1]

I. THE DESCRIPTION OF SCORES USED IN THE ANALYSIS

The four scores used in the analysis of interrelationships are shown in Table XIV-1. The scores include the operational aggregate, and, in addition, a purpose acceptance score derived for each school, a score descriptive of the material resources provided by the school, and a score descriptive of the extent to which community talent and agencies were being used to augment and extend the effectiveness of instruction in operating the programs.

1. Operational aggregate (Column A of Table XIV-1). The operational aggregate was the measure of operational emphasis and effort, qualified according to the relative importance of the purpose, as was described in Chapter XII.[2]

2. The school purpose acceptance score (Column B of Table XIV-1). A purpose acceptance score was derived for each school by summing the ratings assigned by the school raters for the twenty-three purposes of industrial education. This score permits the schools to be compared on the basis of the extent to which the total list of purposes was accepted as goals of the industrial education program in the schools. The score, however, does not take into consideration the relative importance of the purpose. To this extent, then, the purpose acceptance score is independent of the operational aggregate.

The reliability of scores summed for schools was determined in the same manner as the reliability of scores summed for items, as was discussed in Chapter X.[3] For the data in Column B of Table XIV-1, the

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[1]The objective listed in Chapter I, to which the present chapter is addressed, is:

(11). To ascertain the interrelationship among purposes, operations, and resources for programs of industrial education.

[2]Supra, pp. 313-317.

TABLE XIV-1

TABLE OF SCORES FOR FOUR VARIABLES

Columns				Columns			
A	B	C	D	A	B	C	D
*718	103	14.8	5	*578	95	13.0	3
*628	91	13.8	4	571	83	11.0	1
792	92	10.4	3	570	81	10.1	1
781	91	13.2	3	*569	79	14.0	1
746	93	12.1	2	554	71	9.2	1
746	82	14.0	3	554	100	11.0	1
*740	81	13.2	3	550	73	12.8	1
*738	89	12.9	5	543	86	9.0	1
732	77	14.3	1	535	78	13.4	1
*731	114	12.4	2	534	72	9.4	2
*730	91	15.2	5	517	59	11.2	1
*729	61	12.0	3	515	85	13.1	2
*726	90	13.2	3	508	95	10.5	1
705	80	12.0	1	507	72	11.4	3
*702	109	13.0	4	506	83	9.8	2
*701	86	15.5	5	506	113	11.0	3
701	93	12.9	1	504	60	11.9	1
*697	93	15.6	3	497	84	12.2	1
693	91	15.0	2	494	56	8.0	1
685	93	13.2	1	490	69	10.5	2
659	83	14.1	1	454	76	8.1	1
659	88	12.9	1	450	82	8.5	1
651	68	11.5	2	449	77	9.2	1
*650	68	11.8	2	437	70	8.1	2
637	90	11.5	1	431	72	7.2	1
633	86	14.8	4	426	76	8.8	1
632	77	11.0	4	399	77	7.3	1
626	83	11.3	4	387	65	13.9	1
*616	57	10.6	2	372	66	7.0	1
*614	72	9.8	3	369	78	7.2	1
612	103	12.2	2	354	52	9.2	1
605	89	8.5	2	338	74	6.5	1
599	88	14.8	3	324	54	6.5	2
599	78	10.9	1	322	71	7.9	1
589	79	11.7	1	266	60	8.2	1
*582	108	10.9	2	253	46	8.9	1
*582	81	12.0	1	214	77	9.5	1
*580	75	10.2	2				

*Denotes schools offering both industrial arts and trade and industrial education programs.

Column A - Operational aggregate
Column B - Purpose acceptance score
Column C - Resource score
Column D - Use score

sum of squares between raters was 634.895, and, with 74 degrees of freedom, the mean square of raters (MS_R) was 8.580. The residual or error sum of squares was 1125.852, and with (75-1) (23-1) or 1628 degrees of freedom the mean square for error (MS_E) was .692. The reliability coefficient was computed as (8.580 - .692) / 8.580, or .919. A reliability of this magnitude indicates that the ratio of error variance to variance attributable to systematic ratings assigned to purposes was minimal. The efficacy of the rating-scoring procedure is demonstrated further by applying an "F" test to the null hypothesis to the effect that random ratings were assigned by school raters to items. The value of F was computed as $F = MS_R / MS_E$, or 8.580 / .692, or 12.4. With 74 and 1628 degrees of freedom involved, the hypothesis was rejected at the .1 per cent level of significance. The result of this last test indicates that there was practically no possibility that random ratings were assigned to items, but, rather, that systematic judgment was exercised in selecting the numerical response categories on Form 8, Industrial Education: Appraisal of Purposes.[4]

The purpose acceptance score, it should be noted, was taken as a measure of acceptance of the twenty-three purposes of industrial education by the school raters, who included the high school principal and the industrial education teachers in all instances, and, where employed, the directors of vocational education. A high score indicated that the school raters tended to accept all the purposes as goals in the industrial education program in the school, and a low score indicated that not all of the purposes were accepted strongly as goals of the program. A low score could have resulted from moderate acceptance of the purposes as a group, or low acceptance of selected purposes. In light of the high degree of internal consistency, the first alternative appears to be the more logical explanation.

3. The material resource score (Column C of Table XIV-1). The material resource scores listed in Column C of Table XIV-1 were derived from ratings summarized on Form 10A.[5] The scores were obtained by computing the average ratings for each school for three facility items (classroom, shop, and laboratory facilities shown in Tables XII-20 and XII-21[6]), three equipment items (classroom, small tool, and large tool

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[3] Supra, pp. 237-243.

[4] See infra, pp. A-37 ff.

[5] See Analysis of Resources: Industrial Education, infra, pp. A-57 ff.

[6] Ratings of adequacy of laboratory facilities were included in the material resource scores, but this item was not studied in Chapter XII due to the fact that only three of the 75 schools had laboratory facilities.

equipment shown in Tables XII-22, XII-23, and XII-24), and four teaching materials items (general and technical reference materials, audio-visual aids, and teaching outlines shown in Tables XII-25, XII-26, XII-27, and XII-28). The three average ratings then were summed to procure an overall score for material resources.

In deriving the material resource score, it was assumed that within each of the three areas -- facilities, equipment, and materials -- the individual items were of equal importance in contributing to the average scores for each area. Then, it also was assumed that the three resource areas were of equal importance in deriving the material resource scores.[7] Throughout the remainder of this chapter, the score so derived is referred to as the "resource" score.

4. The use of community talent and agencies score (Column D of Table XIV-1). In studying the interrelationship among purposes, operations, and resources for vocational agriculture, as is reported in Chapter VIII, ratings for (1) the use of privately-owned farms for directed experience, (2) the use of community talent and agencies, and (3) the use of the Future Farmers of America organization, indicative of the extent to which these special service resources were used to augment and extend instructional activities, were combined to procure a use of special service resources score. The derivation and use of this score appeared justified in view of the fact that these items, taken individually, were found to be related significantly to variations in operational aggregates. In the study of industrial education, however, a different situation prevailed. Neither student organizations nor directed experience outside the shop was used to any marked extent in the industrial education programs in the sample, as the data in Tables XII-34 and XII-35 show. But teachers in a number of schools, on the average, were making limited to considerable use of community talent and agencies -- industrial education advisory councils, personnel in governmental and private agencies, and agencies of mass media to interpret the programs -- in their instructional programs, as the data in Table XII-33 indicate. This independent variable correlated relatively high with the operational aggregates, according to the correlation coefficient reported in Table XII - 61.

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[7]Except for laboratory facilities, these assumptions are not without basis in fact. Analyses of the individual correlation coefficients shown in Table XII-61 revealed that (1) the two coefficients for facilities did not differ significantly, (2) the three coefficients for equipment did not differ significantly, (3) the four coefficients for materials did not differ significantly, and (4) the average coefficients for the three areas -- .39 for facilities, .53 for equipment, and .62 for materials -- did not differ significantly. Cf. A. L. Edwards, Experimental Design in Psychological Research (New York: Rinehart and Co., 1950), pp. 131-6. Had there been more schools in the sample with laboratory facilities for industrial education, similar coefficients, undoubtedly, would have been obtained for this variable.

Furthermore, when schools were grouped according to the numerical rating category assigned for use of community talent and agencies, the result of an "F" test clearly demonstrated that the mean operational aggregates were not independent of the rating category.[8] This fact having been shown, the ratings for the use of community talent and agencies variable was considered a "use" score which indicated the extent to which the teachers in the schools were exercising imagination, initiative, and resourcefulness to augment and extend the effectiveness of classroom, shop and laboratory instruction.

Product moment correlation coefficients between pairs of variables were computed, and are shown in Table XIV-2. The coefficients between the dependent variable, the operational aggregate, and the purpose, resource, and use scores, and between each pair of scores of these independent variables, ranged from .37 to .70. Inasmuch as a coefficient of .296 is significant at the 1 per cent level, with 75 pairs of scores, all coefficients shown in Table XIV-2 differed significantly from zero.

In terms of r^2, the proportion of variance of one variable attributable to variation in other variables, the range was from .1369 to .49. The three independent variables, individually, accounted for 30 to 49 per cent of the variance of the dependent variable, and thus could be considered moderately to good predictors of this variable. Each of the three indpendent variables, however, could not be described as effective predictors of the other two variables, since the r^2 of the three pairs (Columns B-C, B-D, and C-D in Table XIV-2) ranged from .1369 to .2209.

II. ANALYSES OF OPERATIONS, PURPOSES, AND RESOURCES

The interrelationship among purposes, operations, and resources was analyzed further by a multiple analysis of variance technique. In

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[8] The distribution of scores, according to each numerical rating category assigned on Form 10 for use of community talent and agencies, produced the following data:

Numerical rating category	1	2	3	4	5
Sum of operational aggregates	18998	9272	8015	3421	3087
Number of schools	38	16	12	5	4
Mean operational aggregate	499.951	579.500	667.914	684.200	771.750

For the above distribution, an F of 9.31 was computed, which, with 4 and 70 degrees of freedom, permitted the hypothesis that operational aggregates were independent of the numerical rating category to be rejected at the .1 per cent level of significance.

TABLE XIV-2

INTERCORRELATION OF FOUR VARIABLES

Variable	Column	A	B	C	D
Operational aggregate	A		.55	.70	.58
Purpose acceptance score	B			.44	.37
Resource score	C				.47
Use score	D				

this analysis, the operational aggregate was the dependent variable, and the purpose acceptance, resource, and use scores were the independent variables. To study the main effects and interactions, the schools were dichotomized as follows:

1. Based on the purpose acceptance scores, the schools were divided into a "high" group of the 38 schools with scores of 81 or higher, and a "low" group of 37 schools with scores of 80 or lower.

2. Based on the resource scores, the schools were divided into a "high" group of 37 schools with scores of 11.5 or higher, and a "low" group of 38 schools with scores of 11.4 or lower.

3. Based on the use scores, the schools were divided into a "high" group, which included the 21 schools to which ratings of 3, 4, or 5 were assigned, and a "low" group of 54 schools to which ratings of 1 or 2 were assigned. The "high" group, therefore, included the schools in which the teachers, on the average, indicated that they were making little to considerable use of the special service resource item use of community talent and agencies in their instructional programs.

Thus, eight sub-groups were formed, and these sub-groups are shown in Table XIV-3. A preliminary analysis was made, using the single classification analysis of variance to ascertain whether the operational aggregates were independent of the sub-group in which the school was placed. An F value of 14.45 was obtained, which, with 7 and 67 degrees of freedom, permitted the hypothesis to be rejected at the .1 per cent level of significance.

To test the influence of the three independent variables on the operational aggregates, the sum of squares and the 7 degrees of freedom between the eight sub-groups were analyzed further into seven component parts, with each part based on a single degree of freedom. The results

of the 2 x 2 x 2 analysis of variance are shown in Table XIV-3. The differences were computed for the three main variables and the four interactions. A "t" test was used to ascertain whether the differences were significant, with the standard error of effect determined by extracting the square root of the product of the mean square within sub-groups and the sum of the reciprocals of the number of schools in each sub-group. When the effects of resources and use were held constant, the scores for the high purpose acceptance schools did not differ significantly from the scores for the low purpose acceptance schools. When the effects of purpose acceptance and use were held constant, the difference between the means of the high resource and low resource schools was found to be significant at the .1 per cent level. When the effects of purpose acceptance and resources were held constant, the difference between the means of the high use and low use schools also was found to be significant at the .1 per cent level. None of the interactions was significant.

Although there was a significant relationship between the operational aggregates and the purpose acceptance scores, as measured by the product moment correlation coefficient, when the effects of resources and use were controlled, the variable acceptance did not produce a significant difference. This finding suggests that acceptance of purposes alone does not result in intensified operational activity, especially when adequate resources are not provided, and when extensive use is not made of community resources.

Further analyses were made of the data to study the effects of resources and use alone. The data shown in Table XIV-3 were combined to procure the data shown in Table XIV-4. Table XIV-4 shows the results of a double (2 x 2) classification analysis of variance to test the effects of resources and use, and the interaction of resources x use. The data indicate that there were 15 schools in the high resource-high use sub-group, 22 schools in the high resource-low use sub-group, six schools in the low resource-high use sub-group, and 32 schools in the low resource-low use sub-group. Thus, resources and use tended to fall in the same category.[9]

The hypothesis that the operational aggregates were independent of the sub-group was tested and rejected at the .1 per cent level of significance. Then, the between sub-group sum of squares was partitioned into three parts--one part based on the difference attributable to resources, one part based on the difference attributable to use, and one part based on the interaction of resources and use. The results in

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[9] Forty-seven of the 75 schools were placed in the same categories for resources and for use, and the probability of this placement occuring by chance, according to a chi-square test, is less than .05.

TABLE XIV-3

ANALYSIS OF VARIANCE OF OPERATIONAL AGGREGATES FOR INDUSTRIAL EDUCATION GROUPED ACCORDING TO PURPOSE ACCEPTANCE, RESOURCE, AND USE SCORES

Variable and Classification						
Purpose acceptance	Resource	Use	Number in sub-group	Sum of scores	Mean score	Row
High	High	High	14	10117	722.647	A
High	High	Low	12	7717	643.081	B
High	Low	High	3	1924	641.333	C
High	Low	Low	9	4889	543.222	D
Low	High	High	1	729	729.000	E
Low	High	Low	10	5872	587.200	F
Low	Low	High	3	1753	584.333	G
Low	Low	Low	23	9792	425.737	H

Analysis of Variance

Source of variation	df	Sum of squares	Mean square	F	Hypothesis
Between sub-groups	7	919499.27	131357.04	14.45	Rejected
Within sub-groups	67	609221.08	9092.85	---	$P < .001$
Total	74	1528720.35			

Analysis of Main Effects and Interactions

Source of variation	Combination	Effect	t	Hypothesis
Purpose	(A+B+C+D) - (E+F+G+H)	224.013	1.638	$P \geq .05$
Resource	(A+B+E+F) - (C+D+G+H)	487.303	3.569	$P < .001$
Use	(A+C+E+G) - (B+D+F+H)	477.893	3.495	$P < .001$
Purpose x Resources	(A+B+G+H) - (C+D+E+F)	124.957	.914	$P > .05$
Purpose x Use	(A+C+F+H) - (B+D+E+G)	122.719	.898	$P > .05$
Resources x Use	(A+D+E+H) - (B+C+F+G)	35.341	.258	$P > .05$
Purpose x Resources x Use	(A+D+F+G) - (B+C+E+H)	3.251	.024	$P > .05$

$$t = \frac{\text{effect}}{s_{\text{effect}}}, \text{ with 67 df}$$

$$s_{\text{effect}} = \sqrt{\left[9092.85\right]\left[\frac{1}{14} + \frac{1}{12} + \frac{1}{3} + \frac{1}{9} + \frac{1}{1} + \frac{1}{10} + \frac{1}{3} + \frac{1}{23}\right]} = 136.72$$

Table XIV-4 compare with the results in Table XIV-3, in that the difference attributable to resources was significant at the .1 per cent level, the difference attributable to use was significant at the .1 per cent level, and the interaction of resources x use was not significant.

The means shown in Table XIV-4 prompted other considerations. First, the question may be raised as to whether a significant increment in quality of instruction, as measured by the operational aggregate, may be obtained by use of community talent and agencies, even though resources scored below the median. Secondly, there is the question of whether imporvement in resources, without accompanying changes in use of community resources, would produce an increment in quality of instruction. Answers to these questions were sought by applying Scheffe's test of significance for differences between pairs of means, based on unequal numbers in each sub-group, to the means in Table XIV-4.[10] The results of the tests follow:

1. The hypothesis that there was no difference between the mean of the low resource-low use sub-group (458.781) and the mean of the low resource-high use sub-group (612.833) was rejected at the 5 per cent level of significance.

2. The hypothesis that there was no difference between the mean of the low resource-low use sub-group (458.781) and the mean of the high resource-low use sub-group (617.682) was rejected at the .1 per cent level.

3. The hypothesis that there was no difference between the mean of the low resource-high use sub-group (612.833) and the mean of the high resource-low use sub-group (617.682) was not rejected.

4. The hypothesis that there was no difference between the mean of the low resource-high use sub-group (612.833) and the mean of the high resource-high use sub-group (723.067) was not rejected.

5. The hypothesis that there was no difference between the mean of the high resource-low use sub-group (617.682) and the mean of the high resource-high use sub-group (723.067) was rejected at the 5 per cent level.

6. The hypothesis that there was no difference between the mean of the low resource-low use sub-group (458.781) and the mean of the high resource-high use sub-group (723.067) was rejected at the .1 per cent level.

Results of these tests show that either an appreciable increment in resources or an appreciable increment in use tends to produce a

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[10] H. Scheffe, "A Method for Judging All Contrasts in the Analysis of Variance," Biometrika, 40: 87-104, June, 1953.

TABLE XIV-4

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE THE RELATIONSHIP OF OPERATIONAL AGGREGATES FOR INDUSTRIAL EDUCATION, WHEN SCHOOLS ARE CLASSIFIED ACCORDING TO RESOURCES AND TO USE

	Classifications			
	High Resource High Use	High Resources Low Use	Low Resources High Use	Low Resources Low Use
$\geq Y$	10846	13589	3677	14681
n_i	15	22	6	32
$\bar{Y}$	723.067	617.682	612.833	458.781

Analysis of Variance

Source of variation	df	Sum of squares	Mean square	F	Hypothesis
Between sub-groups	3	808270.32	269423.44	26.55	Rejected
Within sub-groups	71	720450.03	10147.18	---	$P < .001$
Total	74	1528720.35			

Analysis of Main Effects and Interaction

Source of variation	df	Sum of squares	Mean square	F	Hypothesis
Resources	1	233598.51	233598.51	23.02	$P < .001$
Use	1	217066.87	217066.87	21.39	$P < .001$
Resources x Use	1	7638.34	7638.34	.75	$P > .05$
Within sub-groups	71	720450.03	10147.18		

significant increment in quality of program. Where schools were rated "high" for both resources and use, an appreciable increment resulted over schools rated "high" in one category. The difference was significant in one instance, but not in the other, possibly due to the small number of cases (six) in one of the cells. The questions, then, may be answered in this manner: The imagination, initiative, and resourcefulness of teachers, as manifested by the use made of community resources, do tend to produce an increment in quality of program, despite below average resources; however, the most rewarding and significant increment results from providing adequate resources for teachers who make use of community resources in their instructional programs.

III. THE INTERRELATIONSHIP AMONG TYPE OF PROGRAM, RESOURCES, AND USE

Thus far in Chapter XIV the analysis of interrelationship has pertained to the entire 75 school sample of programs of industrial education. It was determined that the adequacy of material resources and the use of community talent and agencies in the instructional program operate independently to produce a significant increment in quality of instruction, as measured by the operational aggregate. Attention then was turned to ascertaining whether the additional of trade and industrial education programs, in itself, constituted a third variable which operated independently of resources and use to produce still higher increments in quality of instruction.

For this analysis, the 75 programs of industrial education were divided into the eight sub-groups, as shown in Table XIV-5. Both the 19 schools offering trade and industrial education in addition to industrial arts, and the 56 schools offering industrial arts only, were divided into high resource-high use, high resource-low use, low resource-high use, and low resource-low use sub-groups. Observation of the data indicates that the schools offering both programs were more likely to fall into the high resource sub-groups, and that the schools offering industrial arts only were more likely to fall in the low resource sub-groups than chance alone would suggest, with the hypothesis that the proportions were independent of the variable of whether one or two programs were offered being rejected at the .1 per cent level. The data also indicate that the schools offering both programs were more likely to fall in the high use sub-groups, and the schools offering industrial arts only were more likely to fall in the low use sub-groups, with the attending hypothesis also rejected at the .1 per cent level. Hence, it may be hypothesized that the organization and administrative structure pertaining to operating programs of trade and industrial education, in itself, may be a variable related to high resources and high use.

Turning now to the eight sub-groups formed and shown in Table XIV-5, a preliminary analysis indicated that the operational aggregates were not independent of the sub-group in which the schools were placed. The sum

TABLE XIV-5

ANALYSIS OF VARIANCE OF OPERATIONAL AGGREGATES FOR INDUSTRIAL EDUCATION GROUPED ACCORDING TO PROGRAM OFFERINGS AND RESOURCE AND USE SCORES

Variable and Classification						
Program offerings	Resource	Use	Number in sub-group	Sum of scores	Mean score	Row
Both	High	High	11	8087	735.181	A
Both	High	Low	4	2532	633.000	B
Both	Low	High	1	614	614.000	C
Both	Low	Low	3	1778	592.666	D
Ind. Arts	High	High	4	2759	689.750	E
Ind. Arts	High	Low	18	11057	614.283	F
Ind. Arts	Low	High	5	3063	612.600	G
Ind. Arts	Low	Low	29	12903	444.934	H

Analysis of Variance

Source of variation	df	Sum of squares	Mean square	F	Hypothesis
Between sub-groups	7	874812.60	124973.23	12.80	Rejected
Within sub-groups	67	653907.75	9759.82	---	$P < .001$
Total	74	1528720.35			

Analysis of Main Effects and Interactions

Source of variation	Combination	Effect	t	Hypothesis
Program offerings	(A+B+C+D) - (E+F+G+H)	212.280	1.514	$P > .05$
Resources	(A+B+E+F) - (C+D+G+H)	408.014	2.910	$P < .01$
Use	(A+C+E+G) - (B+D+G+H)	366.648	2.615	$P < .02$
Program x Resources	(A+B+G+H) - (C+D+E+F)	84.984	.606	$P > .05$
Program x Use	(A+C+F+H) - (B+D+E+G)	119.618	.853	$P > .05$
Resources x Use	(A+D+E+H) - (B+C+F+G)	11.352	.081	$P > .05$
Program x Resources x Use	(A+D+F+G) - (B+C+E+H)	176.646	1.260	$P > .05$

$$t = \frac{\text{effect}}{s_{\text{effect}}}, \text{ with 67 df}$$

$$s_{\text{effect}} = \sqrt{9759.82}\left[\frac{1}{11} + \frac{1}{4} + \frac{1}{1} + \frac{1}{3} + \frac{1}{4} + \frac{1}{18} + \frac{1}{5} + \frac{1}{29}\right] = 140.21$$

of squares and the 7 degrees of freedom between the eight sub-groups were analyzed further into seven component parts, with each part based on a single degree of freedom. When the effects of resources and use were held constant, the difference between means attributable to whether schools offered one or both programs was found not to be statistically significant. When the effects of number of programs offered and use were held constant, the difference between means of high and low resource schools was significant at the 1 per cent level. When the effects of number of programs and resources were held constant, the difference between means of high and low use schools was significant at the 2 per cent level. None of the four interactions was significant. The results of these tests, therefore, tend to support the conclusion that the variable of whether schools offered industrial arts only or trade and industrial education in addition to industrial arts, in itself, did not produce a significant increment in quality of program. Rather, the data show that the provision of more adequate resources and the more extensive use of community resources, which, generally, were associated with the schools offering trade and industrial education programs,accounted for the increments in quality.

Further analyses of the means were made by linear contrast.[11] It was found that there was not a statistically significant difference between the means of the two high resource sub-groups for both programs and the means of the two high resource sub-groups for schools offering industrial arts only. And, similarly, it was found that there was not a statistically significant difference between the means of the two high use sub-groups for both programs and the two high use sub-groups for industrial arts only. There were, however, significant differences between (1) the means of the two low resource sub-groups for both programs and the means of the two low resource sub-groups for industrial arts only, and (2) the means of the two low use sub-groups for both programs and the means of the two low use sub-groups for industrial arts only. If the presumption is accepted that a school that received a relatively high operational aggregate is more likely to be operating a program of industrial education which is manifesting the contemporary design for vocational education than a school that received a relatively low aggregate, then the following generalizations seem appropriate:

1. The variable of whether a school is offering industrial arts only or trade and industrial education in addition to industrial arts does not assure the operation of a socially adapted program of industrial education unless the school that offers both programs is providing adequate resources and unless teachers are making use of community resources.

2. Schools that offer both programs are less likely to rank low on the operational aggregate continuum than schools that offer industrial arts only.

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[11] Scheffe, loc. cit.

SUMMARY OF CHAPTER XIV

Chapter XIV has explored the interrelationship among purpose acceptance scores, operational aggregates, and scores for (1) adequacy of material resources and (2) use of community talent and agencies. Product moment correlation coefficients for six variables ranged from .37 to .70, all differing significantly from zero. In terms of r^2, the proportion of the variance of one variable attributable to variations in the other, the range was from .1369 to .49. None of the independent variables could be described as effective predictors of the other independent variables; however, the three independent variables rated as moderate to good predictors of the dependent variable, the operational aggregate.

When data were analyzed by a multiple classification analysis of variance technique, with the operational aggregate treated as the dependent variable, and the purpose acceptance, resource, and use scores treated as independent variables the results indicated that the difference between the means of the high and low purpose acceptance sub-groups was not significant, but the differences between the means of the high and low resource sub-groups and the high and low use sub-groups were significant. Additional studies of the data pertaining to resources and to use indicated that the mean of schools in the low-resource-low use sub-group was significantly lower than either the mean of schools in the low resource-high use sub-group or the mean of schools in the high resource-low use sub-group. The mean of the schools in the high resource-high use sub-group was higher than any other sub-group. Either high resources or high use produced increments in quality of programs, as measured by the operational aggregate, and both high resources and high use produced still higher increments in quality.

When the four sub-groups formed on basis of resources and use of community resources were sub-divided further according to whether schools offered trade and industrial education in addition to industrial arts, or industrial arts only, it was found that the curriculum variable, in itself, did not produce a significant increment in the operational aggregate measure, with the effects of resources and use held constant. At the same time, however, the data demonstrated that the high resource-high use schools were more likely than not to be the schools which offered trade and industrial education programs, and that schools that ranked low on the operational aggregate continuum were likely to be schools in which industrial arts only was offered. Without adequate resources and use of community resources, the addition of the trade and industrial education program does not produce an increment in quality, but the structure for organizing and administering programs of trade and industrial education appeared to be such that the variables which did tend to result in socially adapted programs of industrial education were associated with these programs.

CHAPTER XV

A SYNTHESIS OF THE ANALYSES OF PROGRAMS OF INDUSTRIAL EDUCATION

The findings pertaining to industrial education, presented in Chapters X to XIV, are synthesized in the present chapter.[1] This chapter is divided into four parts: (1) the direction of program emphasis, (2) the direction of program operation, (3) the direction of program resources, and (4) the implications of desired direction.

I. THE DIRECTION OF PROGRAM EMPHASIS

Section I of Chapter XV deals with the following question posed initially in the design of the study, but modified slightly here:

> 1. To what extent do the purposes of industrial education manifest the conditions and trends identified in Part I of the study, as summarized in the contemporary design for vocational education?[2]

The Desired Direction

The study of industrial education programs was initiated by the delineation and analysis of twenty-three purposes of industrial education. A score was assigned to each purpose by a jury of specialists, and the array of scores as shown in Table X-2[3] was taken to represent the relative importance of purposes in light of the contemporary design for vocational education.[4] In Chapter X, attention was centered on a statistical analysis of the purpose scores, with special emphasis on ascertaining the

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[1] The following objective, listed in Chapter I, is treated in this chapter:

(12.) To analyze and synthesize findings to determine if possible direction and possible implications are suggested as meriting consideration in planning future programs of industrial education.

[2] F.J. Woerdehoff, N.J. Nelson, and J.K. Coster, "Vocational Education in Public Schools as Related to Social, Economic, and Technical Trends" (mimeographed proposal, Division of Education, Purdue University, Lafayette, Indiana, February, 1958), p. 6.

[3] Supra, pp. 240-242.

[4] Supra, pp. 24-25.

reliability of the rating-scoring procedure. Now attention is cast upon a content analysis of the purposes.[5]

The twenty-three purposes of industrial education, for the purpose of this synthesis, also may be grouped into the three major categories used in the synthesis of vocational agriculture:[6] (1) purposes pertaining to occupational proficiency, (2) purposes pertaining to occupational adjustment, and (3) purposes not readily classified, but tending to center in occupational appreciation. The purposes in the first category may be sub-divided into (a) purposes related to abilities of a scientific-managerial orientation, (b) purposes related to abilities centering in industrial skills, and (c) purposes related to abilities associated with personal development. The third category may be sub-divided into (a) purposes related to appreciational abilities, and (b) a purpose related to abilities of an avocational nature.

The purposes subsumed under the three categories and the six sub-groups are shown in Table XV-1.[7] Table XV-1 also shows (1) the ranks assigned to each purpose by a jury of educational specialists for importance, and (2) the ranks assigned to each purpose based on mean operational scores, indicative of purpose emphasis. For purpose importance, the mean ranks for the six sub-groups are 10.2 for the four scientific-managerial purposes, 17.3 for the three skills purposes, 4.0 for the four personal development purposes, 10.5 for the six adjustment purposes, 16.2 for the five appreciation purposes, and 23.0 for the avocational purpose. For purpose emphasis, the mean ranks were 12.8 for the four scientific-managerial purposes, 6.7 for the three skills purposes, 5.2 for the four personal development purposes, 16.0 for the six adjustment purposes, 13.8 for the five appreciational purposes, and 19.0 for the avocational purpose.[8] On the basis

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[5]A content analysis was made in Chapter X to compare ranks of school raters for purpose acceptance, and ranks of three sub-juries and the total jury for purpose importance for (1) purposes related to trade and industrial education programs, (2) purposes related jo industrial arts programs, and (3) purposes common to both programs. See supra, pp. 255-259.

[6]Supra, pp. 214-217.

[7]For a listing of purposes to which the numbers refer, see Form 8, infra, pp. A-37 ff.

[8]The Kruskal-Wallis one way analysis of variance by ranks test was applied to ascertain whether the ranks were drawn from a common population. The hypothesis pertaining to importance was rejected at

TABLE XV-1

RANKS ASSIGNED TO PURPOSES FOR PURPOSE IMPORTANCE AND OPERATIONAL SCORES (EMPHASIS), FOR INDUSTRIAL EDUCATION, SHOWING MEAN RANKS FOR SIX PURPOSE SUB-GROUPS

Purpose Categories																	
Occupational proficiency									Occupational adjustment			Occupational appreciation					
Scientific-managerial			Skills			Personal development						Appreciational			Avocational		
No.	Imp.	Emp.	No.	Imp.	Emp.	No.	Imp.	Emp.	No.	Imp.	Emp.	No.	Imp.	Emp.	No.	Imp.	Emp.
20	7	7	22	14	14	6	1	1	8	3	17	21	11	21	7	23	19
14	9	20	18	18	4	12	2	5	9	4	23	1	13	8			
2	10	9	4	20	2	11	5	3	10	6	22	17	16	16			
5	15	15				19	8	12	13	12	11	16	19	18			
									23	17	13	3	22	6			
									15	21	10						
ΣX	41	51		52	20		16	21		63	96		81	69		23	19
N	4	4		3	3		4	4		6	6		5	5		1	1
$\bar{X}$	10.2	12.8		17.3	6.7		4.0	5.2		10.5	16.0		16.2	13.8		23.0	19.0

of this content analysis, together with the content analysis made in Chapter X,[9] the following generalizations may be drawn.

1. There was evidence of a definite relationship between the order in which the purposes were scored and ranked for importance, and the trends which were judged to merit prime consideration in planning future programs of vocational education. Ranked high among the fifty-five trends identified and studied in Part I of the project were trends which referred to (1) the upward extension and expansion of the educational program, (2) the upward extension of the level and nature of occupational activity, and (3) the increased concentration of industrial productivity into larger units. The increasing complexity of both the social and occupational structure is reflected in the emphasis placed by the jury on the personal development purposes, which were ranked, as a group, highest in importance among the six sub-groups. Thus, attitudes, values, personal traits, and the development and appreciation of high standards of workmanship were recognized as being essential in the emerging socio-occupational structure.

Also ranked high in importance were purposes pertaining to adult education (Purposes Nos. 9 and 10). The high ranks assigned to these purposes attest to the importance of providing educational programs designed to upgrade and/or retrain established workers.

The relative importance assigned to the scientific-managerial purposes, as compared with the purposes pertaining to industrial skills, is taken as a further indication of the constant vertical movement of the general level of the occupational structure.

2. The specialized purposes of industrial education ranked higher than did the general purposes. This generalization is based partially on the data presented in Table X-9 and partially on the data in Table XV-1. When groupings were established for purposes as follows: (1) purposes related to trade and industrial education programs, (2) purposes related to industrial arts programs, and (3) purposes common to both programs, it was shown that the general purposes (the purposes commonly associated with industrial arts programs) ranked significantly lower in importance in light of the contemporary design for vocational education than did either the specialized purposes of

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the 5 per cent level of significance, indicating that the difference in ranks assigned by the jury for the six sub-groups was greater than would be expected to occur by chance. The hypothesis pertaining to emphasis.. was not rejected. Cf. S. Siegel, Nonparametric Statistics for the Behavioral Sciences (New York: McGraw-Hill Book Co., Inc., 1956), pp. 189-93.

[9] Supra, pp. 255-259.

trade and industrial education, or the purposes common to both programs. The purposes in each of the sub-groups shown in Table XV-1 are listed in order of importance. Examination of the purposes in each sub-group indicates that the lower ranking purposes in each sub-group are, as a rule, more general in nature than the purposes which ranked higher. The appreciational and the avocational purposes ranked lower than did the purposes pertaining to occupational proficiency or occupational adjustment.

The finding reported for vocational agriculture is apropos for industrial education in that neither an extremely general program nor a program limited to emphasizing industrial skills is appropriate for planning contemporary programs of industrial education. The data indicate that a broad specialized program is essential to meet the current demands of society.[10]

3. The scoring of the purposes selected for the study was such that all twenty-three purposes of industrial education merit attention in planning education programs. Although the purposes pertaining to occupational proficiency and to occupational adjustment ranked higher than did the purposes pertaining to appreciation, and the specialized purposes generally ranked higher than did the generalized purposes, examination of mean ratings as shown in Table X-4 indicates that no purpose item was rated lower than "moderate" importance.[11] Further, most purposes were rated "considerable" importance or higher. This finding suggests the desirability of providing both general and specialized programs of industrial education in the public schools.

The Existing Situation

If it may be presumed that the hierarchy of purposes manifests the conditions and trends identified in Part I of the study, then the data show that the personnel responsible for programs of industrial education were accepting and emphasizing purposes independent of the hierarchy. The correlation coefficient between the scores assigned to purposes by the jury and the scores assigned by school raters for acceptance did not differ significantly from zero. Neither did the correlation coefficients between the scores assigned for importance and (1) the mean operational scores for all schools (for emphasis), (2) the mean operational scores of the 56 schools offering industrial arts only, (3) the mean operational scores of the 19 schools offering trade and industrial educational programs in addition to industrial arts,

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[10] Cf. supra, p. 216.

[11] Mean ratings of 1, 3, 5, 7, 9 are taken to denote no, limited, moderate, considerable, and very great importance. See rating schedule used by jury, Form 12, infra, pp. A-65 ff.

(4) the mean operational scores of the 132 teachers of industrial arts only, and (5) the mean operational scores for the 64 part-or full-time teachers of trade and industrial education differ significantly from zero. True, the correlation coefficients as determined for the schools offering both programs and for the part- or full-time trade and industrial education teachers were higher than the other coefficients. But the differences between the coefficients were not statistically significant.

On the other hand, the data show that the schools were emphasizing the purposes in the order in which they were scored and ranked by the school raters for acceptance. Correlation coefficients between the scores based on acceptance and the mean operational scores were clustered around .80. From this observation, it may be deduced that the program operations were in closer harmony with what the school raters accepted than with what the jury members considered to be important, and this trend was statistically significant.

This point is illustrated more completely in Table XV-2. The column at the extreme right shows the ranks of purposes based on scores assigned to items by school raters for purpose acceptance. The five columns under the heading "Ranks based on mean operational scores" show the ranks for (1) all schools in the sample, (2) the 19 schools offering trade and industrial education in addition to industrial arts, (3) the 56 schools offering industrial arts only, (4) the 64 teachers assigned part- or full-time to trade and industrial education, and (5) the 132 teachers of industrial arts only. The patterns of emphasis for each of the five groupings and the pattern for acceptance of purposes are very similar. Moreover, the differences between the two columns for schools and the two columns for teachers for the three purpose groupings were small and non-significant. Further, the analysis of variance of ranks was applied to test the hypothesis that the ranks for the three groups were drawn from a common population, and in each of the five instances pertaining to the ranks of the mean operational scores the hypothesis was not rejected. Hence, these data show that there was no difference in order of emphasis between two groups of teachers and two groups of schools, and also, within each group of teachers or schools, there was no difference in the purpose group selected for emphasis. In no instance was there evidence that a distinctive group of purposes was being emphasized, either by schools or by teachers.

Data are also presented in Table XV-2 to give an indication of differences between purpose importance and purpose emphasis. The mean rank of the eight Group "A" purposes, based on importance, is 9.8 compared with the mean rank of 16.1 for emphasis. The mean rank of the seven Group "B" purposes based on importance is 18.7, compared with 10.4 for emphasis. The mean ranks of the eight Group "C" purposes were 8.4 for importance and 9.2 for emphasis. To test hypotheses of no

TABLE XV-2

A COMPARISON OF RANKS BASED ON PURPOSE IMPORTANCE (JURY), PURPOSE ACCEPTANCE (SCHOOL RATERS), AND MEAN OPERATIONAL SCORES, ASSIGNED TO THREE GROUPS OF PURPOSES, SHOWING RESULTS OF TESTS OF SIGNIFICANCE

		Ranks Assigned to Each Group						
			Ranks based on mean operational scores					
				Schools		Teachers		
Purpose number	F tests	Purpose importance (Jury)	All 75 schools	T&I + IA	IA only	Both	IA only	Purpose acceptance (School raters)
Group "A" -- Purposes related to trade and industrial education.								
2		10	9	5	9	8	7	8.5
9		4	23	23	23	23	23	19
10		6	22	22	22	20	22	23
14		9	20	19	21	19	21	21
20		7	7	4	10	3	12	8.5
21		11	21	20	20	21	20	22
22		14	14	9	15	4	14	18
23		17	13	12	13	9	13	20
$\bar{X}$	.05	9.8	16.1	14.2	16.6	13.4	16.5	17.5
Group "B" -- Purposes related to industrial arts.								
1		13	8	11	7	10	8	10.5
3		22	6	10	5	12	6	7
4		20	2	2	2	2	2	14
7		23	19	21	19	22	18	23
16	19	19	18	18	18	18	19	17
17		16	16	17	14	16	16	12.5
18		18	4	3	4	5	5	4
$\bar{X}$	.01	18.7	10.4	11.7	9.9	12.1	10.6	10.8
Group "C" -- Purposes related to both programs.								
5		15	15	14	16	13	15	16
6		1	1	1	1	1	1	1
8		3	17	16	17	15	17	3
11		5	3	7	3	11	3	2
12		2	5	6	6	6	4	5
13		12	11	8	12	7	10	12.5
15		21	10	13	8	14	9	15
19		8	12	15	11	17	11	6
$\bar{X}$	NS	8.4	9.2	10.0	9.2	10.5	8.8	7.6
H tests		.01	NS	NS	NS	NS	NS	.02

difference between mean ranks, the ranks were treated as scores and the hypothesis that the true means are equal was tested by the F statistic. For the Group "A" purposes, the hypothesis was rejected at the 5 per cent level of significance, and for the Group "B" purposes, the hypothesis was rejected at the 1 per cent level. The hypothesis pertaining to Group "C" purposes was not rejected. Compared with ranks based on scores assigned by a jury of specialists for importance, the data show that the schools were placing more emphasis on the Group "B" purposes and less emphasis on the Group "A" purposes than jury scores indicated should be placed. There was, however, substantial agreement between importance and emphasis of the Group "C" purposes.

Although the order of emphasis failed to distinguish between the two groups of schools and the two groups of teachers, such was not the case for intensity of emphasis. The mean operational scores for the schools offering both programs were higher than the mean operational scores for the schools offering industrial arts only for twenty-two of the twenty-three purposes, and significantly higher for fourteen purposes as the data reported in Table XI-12 show. Only in the instance of Purpose No. 7, pertaining to avocational abilities, did the industrial arts only schools score higher than the schools offering both programs. However, in this instance, the difference between the means was not statistically significant. The mean operational scores for the part- or full-time teachers of trade and industrial education also were higher than the mean operational scores of the teachers of industrial arts for twenty-two of the twenty-three purposes, and significantly higher for nineteen purposes, as reported in Table XI-13. Only for Purpose No. 7, pertaining to avocational abilities did the teachers of industrial arts only score higher--significant at the 5 per cent level--than the teachers of trade and industrial education. These findings show rather conclusively that the teachers who were assigned to the specialized programs in trade and industrial education, either on part- or full-time basis, were not only exerting more emphasis and effort to attain the specialized purposes commonly associated with the trade and industrial education programs, but, more importantly and startlingly, actually were exercising more emphasis and effort to attain the purposes commonly associated with industrial arts. From these findings, it reasonably may be concluded that general purposes of industrial education may be attained effectively within the context of a specialized program.[12]

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[12]No attempt was made to trace these differences to sources other than classifications of programs. It might be hypothesized, for example, that the superiority of resources available to teachers in schools offering both programs may have accounted for a sizeable portion of the variations in operational scores.

The ineffectiveness of the operational score as a predictor of the importance score precluded the tests of deviation of the obtained mean operational scores from a fitted regression line. However, an indication of the purposes for which differences were greatest may be obtained by comparing ranks assigned for importance and emphasis, which are shown in Table XV-1. Purposes Nos. 8, 9, 10, 14, and 21 were ranked higher for importance than for emphasis. These differences would tend to indicate that purposes pertaining to the retraining and upgrading established workers (Nos. 9 and 10), the formulation of occupational goals (No. 8), the scientific aspects of industrial occupations (No. 14), and the understanding of labor-management relationships (No. 21) were emphasized less than the relative importance of the purposes would tend to indicate was appropriate emphasis for these purposes. Purposes Nos. 3, 4, 15, and 18 were ranked higher for emphasis than for importance. These differences tend to suggest that the schools were placing more emphasis on simple industrial skills (Nos. 4 and 18), appreciation of the selection, care and use of industrial products (No. 3), and preparation for education beyond high school (No. 15) than the relative importance of these purposes would seem to justify.

The Future Direction

In pointing to future direction, it should be emphasized that the statements mentioned herein are based on the extent to which existing programs of industrial education were manifesting the desirable characteristics of programs of vocational education regardless of program classification; that is, whether the programs were industrial arts, trade and industrial education, or both industrial arts and trade and industrial education. Hence, industrial arts programs were studied in relation to the scoring and ranking of purposes in light of the contempory design for vocational education. This practice was not a denial of the importance of the industrial arts programs as they contribute to the general objectives of American education. Rather, these programs were included because industrial arts programs provide the only industrial education opportunities available to boys enrolled in the majority of Indiana high schools.

The following statements summarize the recommended future direction of industrial education:

1. The relative importance attached to the entire list of twenty-three purposes of industrial education supports the premise that industrial education programs directed toward attaining the general purposes of industrial education and programs directed toward attaining the specialized purposes of industrial education should continue to be operated in public secondary schools in the future.

2. If two types of industrial education programs are to be offered, then there is evidence that attention should be given to delineating the purposes to be emphasized in each program. It seems reasonable to conclude that if the programs are different, then the order of emphasis of the purposes should differ.

3. The specialized purposes related to trade and industrial education should receive greater attention, especially the purposes related to apprentice training and upgrading and/or retraining established workers. Despite the fact that the analysis of trends definitely pointed to the importance of extending educational programs beyond high school, few schools were offering industrial education programs to adults in the community.

4. The relative emphasis to be given skill training in industrial education programs of the future should be examined carefully. True, none of the purposes relating to skills was rated high in importance, although the purpose dealing with specialized skills was scored higher than the purposes pertaining to general industrial skills or to identification skills. The pertinent issue needing resolution is the extent of emphasis to be given simple skills training (Purposes Nos. 4 and 18). Apparently, these purposes are being emphasized at the expense of higher ranking purposes, especially those related to the application of scientific method and thought to industrial occupations (Purpose No. 14), and to helping students formulate realistic occupational goals (Purpose No. 8).

II. THE DIRECTION OF PROGRAM OPERATION

Section II deals with the following question taken from the original proposal:

> 2. To what extent are the operations for programs of industrial education adequate for programs designed in response to the contemporary design for vocational education?[13]

The Desired Direction

The Proposed desired direction of operations in industrial education is formulated on the basis of a review and analysis of the data presented in Tables XI-1 and XI-2.[14] Three levels of operation were established for each of the twenty-three industrial education purposes. The instructional activities characteristic of each level were appraised in light of the contemporary design for vocational education. Levels of operation for each purpose were designated Levels A, B, and C. The activities characteristic of Level of Operation A were those limited to study and discussion type instruction which require limited physical resources and which provide limited exploratory experiences for the student. The activities characteristic of Level of Operation C were those which provided for extensive student participation, and which, in many instances, required extensive physical resources. Level B type activities and resource requirements were more demanding than for Level A and less demanding than for Level C.

On the basis of the ratings assigned to each level of operation as shown in Table XI-1, and the mean rating for each level of operation for the twenty-three purposes as shown in Table XI-2, the following generalizations are made:

1. There was evidence of a definite relationship between the value ratings assigned to each of three levels of operation and the order in which the trends were scored and ranked as meriting consideration in planning future programs of vocational education. Consistent with the constant upgrading (vertical movement) of industrial occupations, the data point to the need for intensifying and extending operational procedures. Hence, relative simple operations are to be augmented by a complex of learning activities which provide amply for directed student experiences and self-directed discovery activities.

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[13] Woerdehoff, Nelson, and Coster, "Vocational Education in Public Schools as Related to Social, Economic, and Technical Trends," loc. cit.

[14] Supra, pp. 263-275.

2. There was evidence that programs of industrial education which limit instruction to Level A type activities are not meeting the demands needed if educational programs are to be consistent with changing conditions in society. On the average, according to calculations made from the data reported in Table XI-2, the schools which limit operations to Level A activities would receive an operational score of only 40 per cent of the maximum score available to the schools. Therefore, it follows, to be truly effective in operating socially adapted programs of industrial education, some activity at Levels B and C is needed. Moreover, the relative amount of activity at Levels B and C should be increased as purposes increase in importance.

The Existing Situation

If it may be presumed that the relative amount of activity evident in Level B and C operations indicates the extent to which programs of industrial education were being operated consistent with the identified conditions and trends, then the data show that the schools studied generally were failing to operate at the desired levels. The summary data in Table XI-4 show that only 44 per cent of the mean operational scores was attributable to operations at Levels B and C.[15] Further evidence of this finding was obtained by comparing the maximum operational aggregate that could be obtained by operation at Level A with the means for (1) the total sample of 75 schools, (2) the 56 schools offering industrial arts only, and (3) the 19 schools offering trade and industrial education programs in addition to industrial arts. The maximum operational aggregate for Level A was 658.27.[16] With a mean for the total sample of 570.57, a standard deviation of 143.73,[17] and $s_{\bar{x}} = 16.1$, the hypothesis that there was no difference between the mean of 658.27 and the obtained mean of 570.57 was rejected at the .1 per cent level of significance. With a mean for the 56 schools offering industrial arts only of 531.82, a standard deviation of 137.48, and $s_{\bar{x}} = 18.37$, the hypothesis that there was no difference between the means also was rejected at the .1 per cent level. For the 19 schools offering both programs, the mean was 684.79, the standard devication 93.45, and $s_{\bar{x}} = 21.44$. This mean exceeded the mean based on the maximum score available for Level A, of 658.27, but the attending hypothesis of no difference was not rejected.

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[15] Supra, p. 284.

[16] This value was computed by squaring each purpose factor, multiplying the square by the maximum operational score available for Level A, as shown in Table XI-1, summing the cross products, and rounding to the desired number of digits.

[17] Supra, p. 317.

Similar computations were made for the operational aggregates of the three groups of teachers. For the 132 teachers of industrial arts only, the mean was 558.20, the standard deviation 158.35, and $s_{\bar{x}} = 13.78$. The hypothesis that there was no difference between the computed mean of 658.27 and the obtained mean was rejected at the .1 per cent level of significance. The mean operational aggregate for the 41 teachers who taught both industrial arts and trade and industrial education was 698.15, with a standard deviation of 154.71 and $s_{\bar{x}} = 24.16$. Again the attending hypothesis was not rejected. But for the 23 teachers of trade and industrial education only, with a mean of 877.74, a standard deviation of 143.01, and $s_{\bar{x}} = 29.82$, the hypothesis that there was no difference between the means was rejected at the .1 per cent level. Hence, there was practically no possibility that the full-time trade and industrial education teachers were restricting their operations to Level A only.

Data presented in Table XI-4 were analyzed to ascertain the extent to which operational activity at Levels B and C was directed toward the more important purposes. The purposes were ranked according to the per cent of the mean operational score that was attributable to operations at Levels B and C. The rank order correlation between the ranks based on per cent of the mean operational scores attributable to the higher levels and the ranks of the mean operational scores was relatively high, .80. The rank order coefficient between ranks based on per cents, and the ranks assigned by the jury of specialists was .01. There was no evidence, therefore, to indicate that operational activity at Levels B and C was being directed toward the purposes scored and ranked highest in importance.

The average ranks for the six purpose sub-groups for both purpose importance and proportion of activity at Levels B and C are shown in Table XV-3. The proportion of activity at the higher levels was higher for the skills and personal development purposes than for the other purpose sub-groups.[18] Except for the purposes related to skills, the differences between the mean ranks for importance and proportion were not great. As can be observed, however, the differences were quite large for a number of individual purpose items.

The Future Direction

For program operation, a future direction is clearly evident. Intensified activity at the higher levels, especially for the more important purposes, is indicated if the programs are to meet the current

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[18] The hypothesis that the ranks were drawn from a common population was not rejected, according to the results of the Kruskal-Wallis H-test. Cf. Siegel, loc. cit.

TABLE XV-3

RANKS ASSIGEND TO PURPOSES FOR PURPOSE IMPORTANCE AND PROPORTION OF OPERATIONAL ACTIVITY ATIRIBUTABLE TO OPERATIONAL LEVELS B AND C FOR INDUSTRIAL EDUCATION, SHOWING MEAN RANKS FOR SIX PURPOSE SUB-GROUPS

Purpose Categories																	
Occupational proficiency						Occupational adjustment			Occupational appreciation								
Scientific-managerial			Skills			Personal development						Appreciational			Avocational		
No.	Imp.	Pro.	No.	Imp.	Pro.	No.	Imp.	Pro.	No.	Imp.	Pro.	No.	Imp.	Pro.	No.	Imp.	Pro.
20	7	2.5	22	14	9	6	1	2.5	8	3	13.5	21	11	18	7	23	19
14	9	16	18	18	12	12	2	5	9	4	21.5	1	13	7			
2	10	11	4	20	1	11	5	15	10	6	23	17	16	21.5			
5	15	17				19	8	9	13	12	5	16	19	20			
									23	17	9	3	22	5			
									15	21	13.5						
X	41	46.5		52	22		16	31.5		63	85.5		81	71.5		23	19
N	4	4		3	3		4	4		6	6		5	5		1	1
$\bar{X}$	10.2	11.6		17.3	7.3		4.0	7.9		10.5	14.3		16.2	14.3		23.0	19.0

demands in society.[19] The intensified activity at the higher levels means that in addition to the study-discussion type of instructional activities characteristic of Level A, increased provision should be made for instructional activities in which students participate in exploring, experimenting, planning, and thinking, in real or simulated occupational situations.

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[19]Further analyses are being made of the data to study the relationship between operation at the three levels and selected variables. This analysis will yield data to answer the question of whether the industrial arts teachers tend to operate at the higher levels for the purposes classified as industrial arts purposes, and whether the trade and industrial education teachers tend to operate at higher levels for the purposes which are characteristic of this program.

III. THE DIRECTION OF PROGRAM RESOURCES

Section III deals with the following three questions stipulated in the original proposal:

> 3. To what extent are the resources for offering industrial education adequate for socially adapted programs?
>
> 4. To what extent are resources, purposes, and operations of programs of industrial education interrelated?
>
> 5. To what extent do schools vary in operations and resources when grouped according to selected school and community variables?[20]

The data on which the synthesis in the present section is based were presented in Chapters XII, XIII, and XIV. Purpose scores, as presented in Chapter X, and operational scores, as presented in Chapter XI, were combined to obtain for each school an operational aggregate. The operational aggregate was defined as the summation of the operational emphasis and effort put forth to attain each purpose, modified mathematically according to the relative importance of the purpose. The position of a given school on the operational aggregate continuum, in relation to other schools, was taken as an indication of the extent to which the program was being operated in accordance with the contemporary design for vocational education. Once the operational aggregate measure was determined for the schools in the sample, and, also, for the teachers individually in each school, the investigative problem became one of studying the relationship between a multiplicity of independent variables --which included selected material and human resource variables -- and the dependent variable, the operational aggregate. Having determined that a relatively large number of material and human resource variables were related significantly to variations in operational aggregates, the variables themselves were studied to ascertain whether school and community variables could be identified which accounted for variations in the resource items. Lastly, in Chapter XIV, additional statistical tests were applied to study the interrelationship among purposes, operations, and resources.

The Desired Direction

The array of operational aggregates shown in Table XII-2 demonstrates amply that there was wide variation in the extent to which programs of industrial education in the selected sample were manifesting contemporary societal conditions and trends. The distribution of

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[20] Woerdehoff, Nelson, and Coster, "Vocational Education in Public Schools as Related to Social, Economic, and Technical Trends," loc. cit.

aggregates approximated a "normal" distribution, with a range from 214 to 918, a mean of 570.57, and a standard deviation of 143.72.[21] The study of material and human resources and of school and community variables was directed toward identifying possible sources of variation. The assumption here was that by identifying variables which statistically distinguished programs that ranked high in social adaptability and those that ranked lower, the results could be projected to point the direction to future development which may bring about increased increments in quality of instruction as related to program demands. The results of these analyses support the following generalizations:

1. The constant upgrading of the occupational structure pertaining to industry necessitates the constant upgrading of material resources. The availability and suitability of material resources may not assure the operation of a socially adapted program of industrial education. But the results of tests of significance applied to determine relationship between selected material resource variables, including three facility variables, three equipment variables, and four teaching materials variables, and the dependent variable, demonstrated a significant relationship for nine of the ten variables. The correlations of the nine independent variables with the dependent variable, the operational aggregate, ranged from .341 to .660, according to the data in Table XII-61.[22] When the ratings for the three categories of variables were averaged, and the averages summed for each school, the correlation between the score so derived and the dependent variable was .697.[23] A projection of the resource score from the obtained mean for the sample of 11.249, based on the data in Table XIV-1,[24] to a maximum mean of 21, is shown in Table XV-4. The projection, based on a regression line of the operational aggregate on the resource score, assuming both linearity of relationship and homoscedasticity, indicates that for a mean resource score of 21, the best estimate for the operational aggregate is 966. Since the .05 critical region for the obtained mean of 570.57, with s = 143.73, $s_{\bar{x}}$ = 16.6, and df = 74, is less than 537.37 and greater than 603.76, there is little or no question that the best estimate of 966 represents a significant increment in the quality of instruction above existing operation. Even if the mean resource score were increased to 15, which according to the scoring procedure used, would represent an average rating of adequate for the ten items, as applied on Form 10A,[25] the best estimate of the operational aggregate would be 722, also a statistically significant increment.

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[21] Supra, p. 317.

[22] Supra, p. 403.

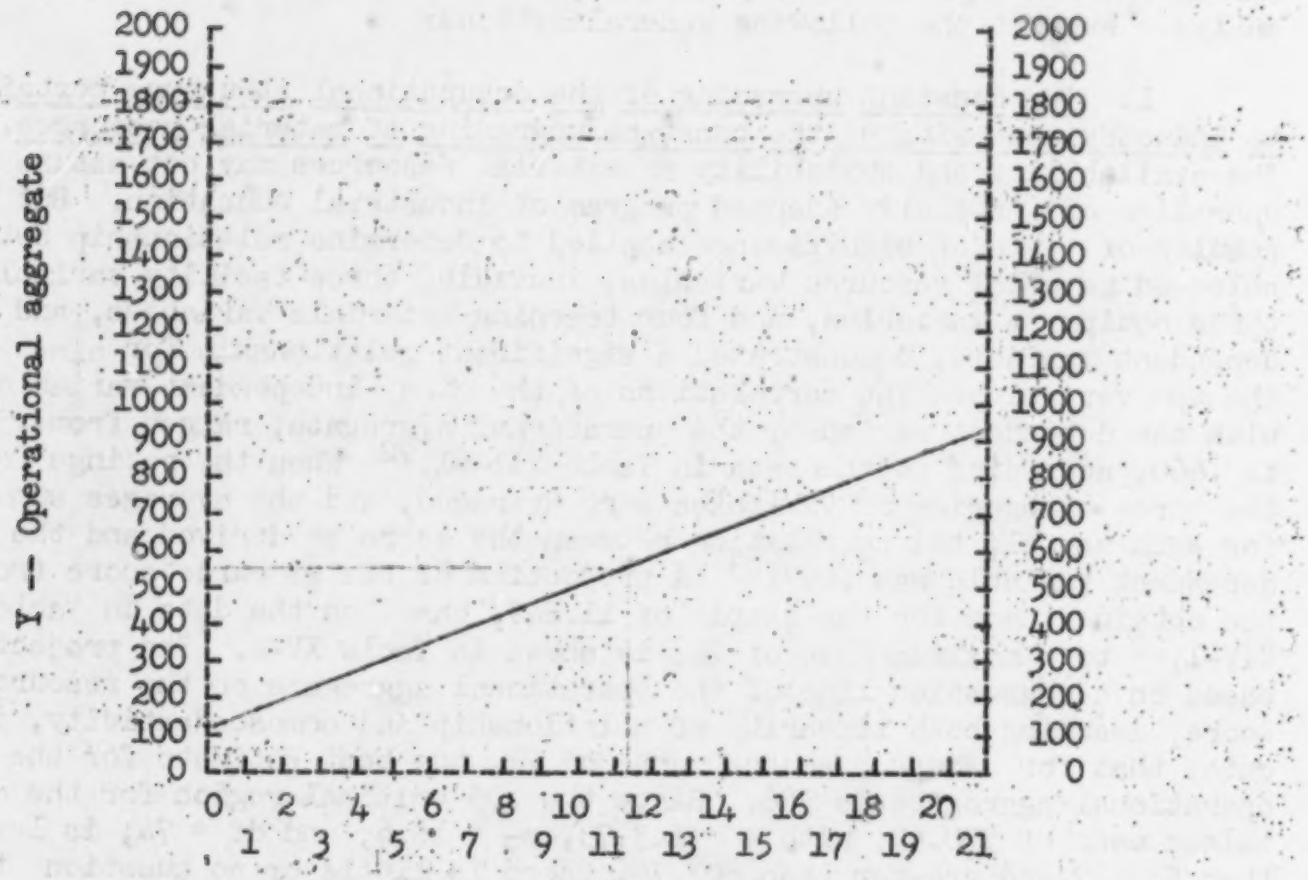
[23] Supra, p. 448

[24] Supra, p. 444.

[25] Infra, pp. A-57 ff.

TABLE XV-4

REGRESSION OF OPERATIONAL AGGREGATE ON RESOURCE SCORE
FOR INDUSTRIAL EDUCATION



$\Sigma Y = 42793$ $\quad \Sigma X = 843.7$

$\Sigma Y^2 = 25945265$ $\quad \Sigma X^2 = 9944.09$

$\bar{Y} = 570.57$ $\quad \bar{X} = 11.249$

$\Sigma XY = 499740.8$

$\hat{Y}_i = 115.08 + 40.5\ X_i$

$t = (40.5 - 0) / 4.874 = 8.31$, with df = 73

The findings with reference to material resources denote that the lack of adequate resources limit the effectiveness of operations, and, in effect, tend to restrict the scope of operations to the type of instructional activities suggested by Level of Operation "A". Concomitantly the findings tend to suggest that the operation of programs designed in response to societal conditions and trends is contingent upon the adequacy of resources provided to operate the programs. The broad societal trends which have brought about changes in the occupational structure, and which have engendered alteration in program operations, also have modified the resource requirements for program operation. Hence, it may be concluded that if schools are to manifest societal changes related to preparation for proficiency in industrial occupations, resource provisions must parallel occupational demands.

2. The direction of program emphasis and program operation points to increasing emphasis on the effective use of community resources. Data were presented in Chapters XII and XIV to show that the extent to which teachers were utilizing community resources —i.e., community agencies and talent — in their instructional program was related significantly to variations in the operational measure. Although this variable was treated as a school variable — the ratings for the individual teachers in multiple teacher schools were summed and averaged -- the variable actually is a measure of the extent to which teachers were exercising imagination, initiative, and resourcefulness to give meaning to instructional activities, to integrate the instructional program with the industrial climate in the community, and to utilize the resources at hand to augment and extend the effectiveness of instruction.

Unlike the use score for vocational agriculture, which was derived from the sum of three ratings,[26] the use score for industrial education was based on a single rating.[27] This item, use of community talent and agencies, correlated .581 with the dependent variable.[28] The mean use score, which, in effect, was the mean rating assigned on Form 10A, was 1.947. A projection of this score to a maximum allowable of 7, denoting very extensive use of community talent and agencies, is shown in Table XV-5. For a mean use score of 7, assuming both linearity of relationship and homoscedasticity, the best estimate of the operational aggregate is 924. For a mean use score of 5, denoting "considerable" use of community talent and agencies in the instructional program, the best estimate for the operational aggregate is 784. In both instances, hypotheses to the

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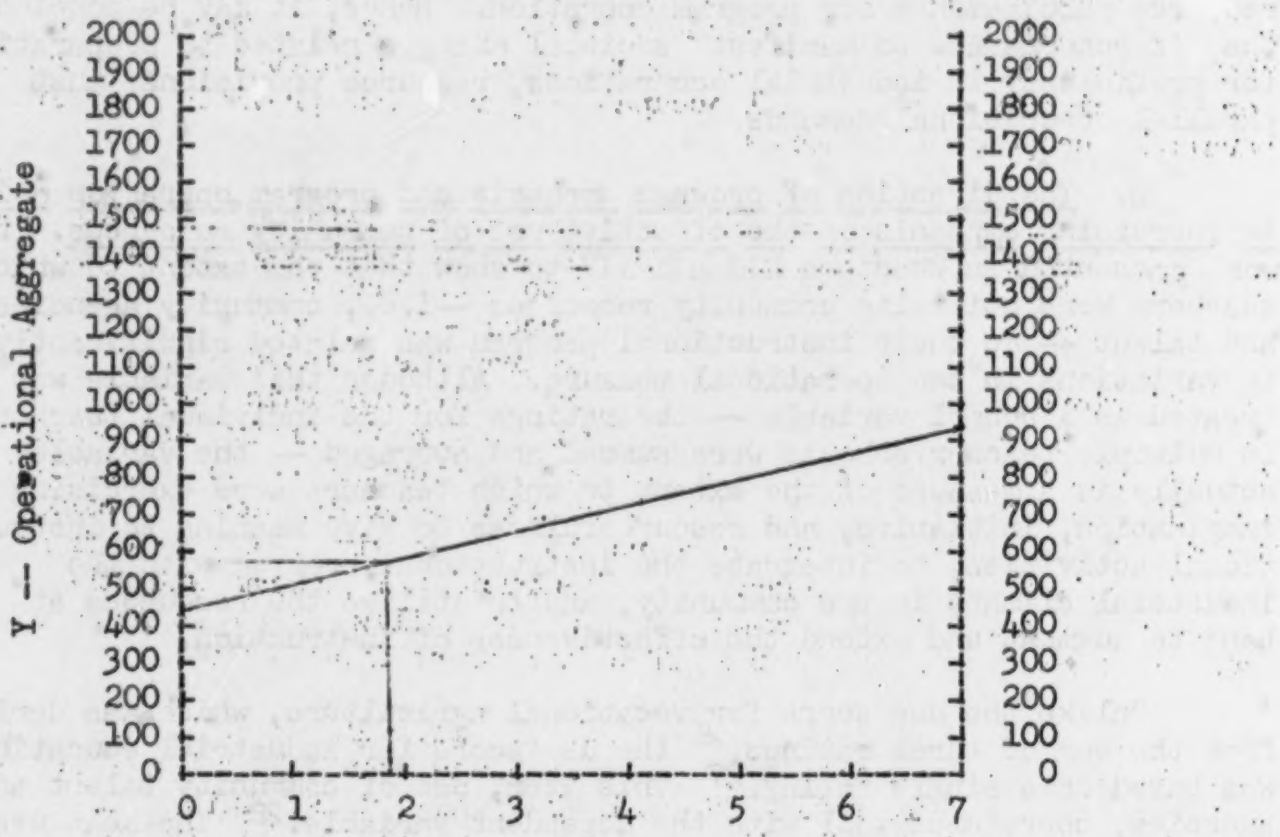
[26] Supra, p. 204.

[27] Supra, p. 446.

[28] Supra, p. 403.

TABLE XV-5

REGRESSION OF OPERATIONAL AGGREGATE ON USE SCORE
FOR INDUSTRIAL EDUCATION



$\Sigma Y = 42793$ $\Sigma X = 146$

$\Sigma Y^2 = 25945265$ $\Sigma X^2 = 390$

$\bar{Y} = 570.57$ $\bar{X} = 1.947$

$\Sigma XY = 90706$

$\hat{Y}_i = 434.33 + 69.97 X_i$

$t = (69.97 - 0) / 11.44 = 6.12$, with df = 73

effect that there was no difference between the obtained mean and the projected means were rejected.[29]

... The findings with reference to use of community resources denote an increase in quality of instruction as more extensive use is made of agencies and talent available in the community. The slope of the regression line indicates that the increments may continue as more extensive use is made of these resources. But the projection of future direction, it should be pointed out, is based on the assumption that the special service resources will be used prudently, and with insight, caution, and purpose.

3. The quality of programs of industrial education is a function of the experience and training of the teacher. Results of analyses presented in Chapter XII indicate that operational aggregates were significantly higher for teachers who had advanced training (beyond the bachelor's level), and also for teachers who were experienced either in teaching or non-teaching fields. This finding was especially pertinent for the industrial arts teachers, where the sample size was relatively large (126). As to advanced training in special fields, findings reported in Tables XII-41 to XII-50 indicated that teachers who had had advanced training in general engineering, advanced shop, industrial management, educational guidance, and industrial education

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[29] Interpretation of the data presented in "1" and "2" should take into consideration the relatively high relationship between resource scores and use scores. The product moment correlation is .47, and the corresponding "b" value for the regression of the use score on the resource score differs from zero at the .1 per cent level of significance. Using a regression equation, the best estimate of a use score for a resource score of 21 is 5.34. A partial correlation for operational aggregate and resource scores of .59 was obtained when the effect of use was removed, and a partial correlation of .40 was obtained for operational aggregates and use scores when the effect of resource scores was removed. The multiple correlation ($R_{o \cdot ru}$) was .755, indicating that 57 per cent of the variance of the operational aggregate could be accounted for by the combined effect of the resource and use scores. The projections shown in Tables XV-4 and XV-5 are based, therefore, on the assumption that the intercorrelation of resource scores and use scores will prevail. If the use scores were held constant at the obtained mean of 1.947, and the resource mean projected to 21, the best estimate of the operational aggregate would be 876. If the resource mean were held constant at 11.249, and the use mean projected to 7, the best estimate of the operational aggregate would be 769. The projection of the resource mean to 21 and the use mean to 7 would give a best estimate of the operational aggregate of 1077. Cf. E.F. Lindquist, Statistical Analysis in Educational Research (Boston: Houghton Mifflin Co., 1940), pp. 248-56.

received significantly higher operational aggregates than teachers who did not report advanced training in these fields.

4. The quality of programs of industrial education increases as the programs themselves become more specialized. Previous mention was made of the finding that, for individual purposes, the teachers who taught part- or full-time in trade and industrial education programs received higher operational scores for all the trade and industrial education purposes, and for fourteen of the fifteen purposes related to industrial arts or pertaining to both programs, than did the teachers assigned to industrial arts. The data in Table XII-19 indicate that the mean operational aggregates increased as the programs, especially the industrial arts programs, became more specialized.[30] These data tend to support a conclusion that generalized purposes are treated more effectively in a specialized program than in a generalized program. Despite evidence that many specialists in education and allied fields believe that vocational programs should become more general,[31] the evidence presented herein suggests that generalness very likely may be a deterrent to quality.

5. The quality of programs of industrial education is a function of the desire of members of a community to want and be willing to support quality education. In the design of the study, it was hypothesized that selected school and community variables, such as size of school, geographic location, financial ability to support educational programs, composition of the population, and whether the schools offered industrial arts only or trade and industrial education in addition to industrial arts, were related significantly to (1) variations in resources, and (2) variations in operational aggregates. The results of statistical tests presented in Chapter XIII show that resources varied widely, and that the larger schools and schools where the student population was from urban areas provided more adequate material resources and employed teachers with higher education and experience qualifications than smaller schools or rural schools.

The results of analyses presented in Chapter XII indicated that operational aggregates varied widely, and that the principal school and community variables related to variation in the operational measure were whether the schools offered one or both programs of industrial education, and the financial effort exerted to support programs of education in the local schools. Size of school, per se, was found to be a contributing

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30 Supra, p. 350.

31 F.J. Woerdehoff, N.J. Nelson, and J.K. Coster, Vocational Education in Public Schools as Related to Social, Economic, and Technical Trends: Part I. The Analysis of Trends and Concepts (Studies in Education, No. 1; Lafayette, Indiana: Purdue University, Division of Education, 1960), pp. 32-37.

variable to variation in the operational measure. It could not be concluded that there was a difference in mean operational aggregates of schools in three size groups offering industrial arts only, or in two size groups offering both programs. But size, apparently, was a major determinant in whether schools offered trade and industrial education, and, hence, a contributing variable. Although the hypothesis that the true difference between the means of the operational aggregates for the schools offering one program and the schools offering both programs was zero was rejected, more sophisticated analyses of available data demonstrated that where the effects of resources and use of community resources were controlled, the effect of type of program was not significant.[32] But there was a greater likelihood that material resources and use of community resources would be above average for the 75 school sample when trade and industrial programs were offered, and, concomitantly, only one of the 19 schools offering trade and industrial education scored below the mean for the entire sample.

The analyses of the effect of financial effort exerted to support programs of education, which proved fruitful in accounting for variations in the operational aggregate and the resource and use score for programs of vocational agriculture, were replicated with the industrial education schools.[33] The working hypothesis was that variations in operational aggregates, resource scores, and use scores were related to effort being exerted to support programs of education (regardless of financial ability to support education) as measured by assessed valuation per enrolled pupil. The schools in the sample, accordingly, were divided into three financial ability groups, and the schools in each group were classified as "high effort" or "low effort" schools. The effort groupings were were based primarily on (1) financial ability to support education, (2) the tuition tax rate, and (3) the mean salary of teachers in the school corporation. The results of a 2 x 3 analysis of variance design were reported in Chapter XII.[34] The difference ascribable to ability was not significant, but the difference ascribable to effort was significant at the .1 per cent level. Interaction was not significant.

Analyses of the main effect of financial ability and effort on resource and use scores have been made, and are reported in Tables XV-6

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[32] Cf. supra, p. 454. One plausible explanation for this finding is that a relatively large number of schools were offering programs which were similar in nature to the trade and industrial programs, but which did not meet the technical definitions and requirements of these programs, and, hence, were classified as industrial arts.

[33] Supra, pp. 230-233.

[34] Supra, pp. 331-332.

and XV-7, respectively. A 2 x 2 design was used in these analyses. The schools were divided into two groups, based on financial ability, with 37 schools in the high ability group and 38 schools in the low ability group. Likewise, the schools were divided into two effort groups, with 37 schools in the high effort group and 38 schools in the low effort group. The hypothesis that the resource scores were independent of the four sub-groups was rejected at the 1 per cent level of significance. When the main effects and interactions were studied, the difference ascribable to effort was significant at the 1 per cent level, but the difference ascribable to ability and the interaction of ability and effort were not significant, according to the data in Table XV-6.

In analyzing the use scores, it was found that the hypothesis that the use scores were independent of the four sub-groups was not rejected, according to the data in Table XV-7. When the main effects and interactions were studied, it was found that the difference ascribable to effort was significant at the 5 per cent level. The difference ascribable to ability and the interaction of ability and effort were not significant.

The fact that the findings for both vocational agriculture and industrial education with regard to the effect of effort on operational aggregates, resource scores, and use scores were quite similar suggests that the desire of citizens of a community to support quality programs is a powerful determinant, not only in providing more adequate resources, but also in the extent to which the teachers exercise initiative, imagination, and resourcefulness in making use of community resources to augment the instructional program.

The Existing Situation

The status of resources has been described in Chapter XIII, and the relationship between two resource measures ---the resource score and the use score — have been analyzed in Chapter XIV. Hence, the present sub-section is reduced to two further generalizations pertaining to the analysis of resources in the 75 school samples.

1. The resources available or used in programs of industrial education varied widely. Since both the adequacy of material resources and the use of community resources have been shown to be related closely to variations in the operational measure, it is logical to surmise that variations very likely would be evident in the extent to which the schools offer programs of industrial education which manifest the previously identified social, economic, and technical trends as long as resources are permitted to vary. True, some variation is to be expected. Indeed, for a large sample of schools, the variations of resource scores probably would approximate a normal distribution. In the instance of the present sample, the resource scores ranged from 6.5 to 15.6. The rating procedure used on Form 10A transformed the range from 2.17 to 5.2,

TABLE XV-6

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE THE RELATIONSHIP BETWEEN RESOURCE SCORES FOR INDUSTRIAL EDUCATION, AND THE MAIN EFFECTS OF FINANCIAL ABILITY AND EFFORT

Classifications

	High ability High effort	High ability Low effort	Low ability High effort	Low ability Low effort
ΣX	229.00	198.40	220.50	195.80
n	18	19	19	19
$\bar{X}$	12.722	10.442	11.605	10.305

Analysis of Variance

Source of variation	df	Sum of squares	Mean square	F	Hypothesis
Between sub-groups	3	70.771	23.590	4.38	Rejected
Within sub-groups	71	382.257	5.384		$P < .01$
Total	74	453.028			

Analysis of Main Effects and Interaction

Source of variation	df	Sum of squares	Mean square	F	Hypothesis
Effort	1	60.048	60.048	11.15	$P < .01$
Financial ability	1	7.363	7.363	1.37	$P > .05$
Effort x ability	1	4.994	4.994	.84	$P > .05$
Within sub-groups	71	382.257	5.384		

TABLE XV-7

RESULTS OF TESTS OF SIGNIFICANCE APPLIED TO DETERMINE THE RELATIONSHIP BETWEEN USE SCORES FOR INDUSTRIAL EDUCATION, AND THE MAIN EFFECTS OF FINANCIAL ABILITY AND EFFORT

Classifications

	High ability High effort	High ability Low effort	Low ability High effort	Low ability Low effort
ΣX	40	35	43	28
n	18	19	19	19
$\bar{X}$	2.2222	1.8421	2.2632	1.4737

Analysis of Variance

Source of variation	df	Sum of squares	Mean square	F	Hypothesis
Between sub-groups	3	7.7279	2.5760	1.87	Not rej.
Within sub-groups	71	98.0588	1.3811		P > .05
Total	74	105.7867			

Analysis of Main Effects and Interaction

Source of variation	df	Sum of squares	Mean square	F	Hypothesis
Effort	1	6.4090	6.4090	4.64	P < .05
Financial ability	1	.5022	.5022	.36	P > .05
Effort x ability	1	.7852	.7852	.57	P > .05
Within sub-groups	71	98.0588	1.3811		

or from very inadequate to adequate. The semi-interquartile range in terms of resource scores was from 9.5 to 13.1, and in terms of average ratings on Form 10A was from 3.17 to 4.67.

The use scores varied similarly. The range, based on ratings on Form 10A, was from 1 to 5, or from not used to used considerably. One half of the schools indicated no use of community resources, and only four of the 75 schools received a rating to indicate that considerable use was being made of these resources.

The range in resource scores was less for the schools offering both programs than for the total sample. For the 19 schools offering trade and industrial education in addition to industrial arts, the range was from 9.8 to 15.6 for the scores, and from 3.27 to 5.2 for the average ratings. Only four scores for these schools were below the sample mean. The use scores ranged from 1 to 5, but of the 21 schools which received use scores of 3 or higher, 12 were schools offering trade and industrial programs. Thus, 63 per cent of the schools offering both programs received use scores of 3 or higher, whereas only 16 per cent of the schools offering industrial arts only received use scores of 3 or higher. These data, together with data presented elsewhere, indicate that more adequate resources and more extensive use of community resources were associated with the schools offering trade and industrial education programs.

2. The data tended to demonstrate a general inadequacy of resources. Using the same rationale that was applied in determining adequacy scores for vocational agriculture programs, an average rating of 5 for resource or use was set as the desired minimum for adequacy. The rating categories on Form 10A were designed so that ratings of 1, 3, 5, and 7 denoted not available, inadequate, adequate, and very adequate for resources, and not used, used little, used considerably, and used extensively for special service resources. For the resource score, where three average ratings were summed, a score of 15 was set as the desired minimum for adequacy.

The mean resource score was 11.249, with standard deviation of 2.474 and $s_{\bar{x}} = .286$. The hypothesis that the true mean of the population was 15 was rejected at the .1 per cent level of significance. Only four of the 75 schools received a resource score of 15 or higher. The mean use score was 1.947, with $s = 1.196$ and $s_{\bar{x}} = .138$. The hypothesis that the true mean of the population was 5 also was rejected at the .1 per cent level. Only four schools received use scores of 5 or higher. Hence, in both instances, the mean scores of the sample were significantly lower than the arbitrarily set standards.

The Future Direction

The future direction of program resources for industrial education is quite similar to the future direction of program resources for vocational agriculture.[35] The development of socially adapted programs is contingent upon providing adequate material resources and making use of available community resources. Program resources must parallel occupational demands. The findings for the two programs are also similar in that it has been shown that quality of instruction as measured by the operational aggregate, program resources, and use of community resources are related to the apparent community desire to support quality educational programs as determined by the extent to which financial effort was exerted to support programs of education.

The findings related to industrial education bring forth three additional points which were not studied in the vocational agriculture data. First, with the larger sample of teachers it was demonstrated that the training and experience of teachers were related significantly to variations in the operational measure. Second, it was demonstrated that the more specialized programs scored higher than the more general programs. Third, the data indicated that the structure for organizing and administering programs of industrial education was such that not only did the schools offering trade and industrial education score higher on twenty-two of the twenty-three individual purposes, and the part- or full-time trade and industrial education teachers score higher on twenty-two of the twenty-three purposes, than the schools offering or teachers of industrial arts only, but also the probability that a school would score low on the operational measure scale was much greater when the school did not offer trade and industrial education.[36]

From these findings, it may be deduced that for a school to move in the direction of a socially adapted program, one formulated in light of the contemporary design for vocational education, primary consideration should be given to establishing realistic minimum requirements for material resources. Thus, it is contended that appropriate classroom, shop, and laboratory facilities and equipment, and adequate, up-to-date teaching materials will contribute to higher levels of operation. Lack of adequate resources, it has been shown, tends to limit effectiveness of operation by restricting both content and methodology. Then, too, increments in quality may be gained by offering programs centered in specialized areas. Lastly, consideration should be given to offering the specialized trade and industrial programs in addition to the more general industrial arts programs.

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[35] Supra, pp. 235-236.

[36] Supra, p. 455.

IV. THE IMPLICATIONS OF DESIRED DIRECTION

From the previously reported summaries and syntheses, the following implications for desired direction are drawn:

1. The trends which point to the vertical expansion of the occupational structure and to interpersonal relations in an expanding technical society lead to needed emphasis on the purposes indicative of and closely related to technological and managerial changes in industry, and to personal development; to operations at higher levels; and to resources which enable operations to be conducted at higher levels.

2. The trends which point to the expansion and extension of educational opportunities lead to the need for expanding educational programs, both for persons who aspire to higher positions on the occupational structure, and for persons who wish to prepare for new or different positions.

3. The findings of special significance for administrators at state and local levels are centered in the need for defining or redefining resource requirements in order to provide resources in line with emerging program demands.

4. The findings of special significance for both general and specialized programs of industrial education are centered in delineating specific purposes to be emphasized, and to directing operations and providing resources which will assure the attainment of the delineated purposes.

5. The findings of special significance to general programs of industrial education are centered in the thesis that general purposes are not attained in a context in and of themselves, but, rather, are attained most effectively within the context of a specialized program.

6. The findings of special significance to program planners in local schools are centered in the issue of breadth of program offerings. Where student enrollments and financial resources are inadequate to support a wide range of industrial education offerings, the data presented herein tends to support the thesis that the desired objectives may be attained more effectively when a specialized subject area is selected, when adequate resources to support the area are provided, and when a teacher specially qualified by training and experience in the area is employed.

7. The findings of special significance to the selection of subject areas point to the desirability of selecting areas which in themselves provide maximum opportunities for defining and illustrating the contemporary trends in industrial occupations. Where a choice of area

must be made, the basis of selection should be the instructional possibilities and the maximization of transfer opportunities, rather than the practical and economic consequences of the area.

8. The findings of special significance to teacher preparation and selection are centered in the value of practical experience in industry and the value of advanced education to give depth and dimension to instructional activities.

9. The findings of special significance to school reorganization are centered in the increased possibilities of breadth of program offerings, auxiliary resources (e.g., guidance and testing programs), and specialized supervisory services not readily available in smaller schools.

10. The findings of special significance to school-community development are centered in the need for recognizing and acting upon the relationship, strongly suggestive of affective behavior related to attitudes and values, between the desire to provide quality programs as indicated by financial effort exerted to support education and the quality of education in the community.

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APPENDIX A

FORMS

PURDUE UNIVERSITY
DIVISION OF EDUCATION

Vocational Education Research Project
Cooperative Project 385 (7784)

Form 2

GENERAL INFORMATION SURVEY[1]

Note: There are twelve items to complete. The directions are included with each item.

1. Name of School _____

2. School Organization. (Check one)

_____ (1) 8-4

_____ (2) 6-2-4

_____ (3) 6-6

_____ (4) 6-3-3

_____ (5) Other (Specify) _____

3. Enrollment data, grades 9-12. (Give number in each grade and the total number in 9-12.)

_____ (1) 9th Grade

_____ (2) 10th Grade

_____ (3) 11th Grade

_____ (4) 12th Grade

_____ (5) Total, 9-12

[1] This instrument was designed for use in a study entitled "Vocational Education in Public Schools as Related to Social, Economic, and Technical Trends," financed in part by a contract with the Research Section of the U. S. Office of Education. Professors F. J. Woerdehoff, N. J. Nelson, and J. K. Coster are directors of the project; W. K. Bugher is research associate; and E. S. Wagner and J. M. Grantham are research assistants, all of the Division of Education of Purdue University. This instrument was prepared by the directors of the project, with the assistance of the research associate and research assistants.

4. Membership in North Central Association of Secondary Schools. (Check one)

_____ (1) Yes. Date:_____

_____ (2) No

5. Rural-Urban Classification of High School Student Body. (Check one)

_____ (1) Completely urban

_____ (2) Highly urban

_____ (3) Completely rural

_____ (4) Highly rural

_____ (5) Urban-rural in about same proportion

6. Length of School Term. (Check one)

_____ (1) 8½ months

_____ (2) 9 months

_____ (3) 9½ months

_____ (4) 10 months

7. Supervisory assistance in vocational education. (Check all that apply)

_____ (1) Principal

_____ (2) General secondary supervisor and/or curriculum head

_____ (3) Vocational coordinator, director, or supervisor

_____ (4) Other (specify)_____

8. Guidance and Counseling Services Available. (Check the one that applies)

_____ (1) No special guidance personnel

_____ (2) Part-time guidance personnel

_____ (3) Full-time guidance personnel (equivalent of one or more)

9. Budget Allocations. (Check appropriate items)

Yes		No	Items
Adequate	Inadequate		
			(1) Teacher Transportation
			(2) Field trips and/or visitations
			(3) Teaching aids (library, audio-visual, etc.)
			(4) Shop and Laboratory Tools and equipment
			(5) Other (Specify)_____

10. Type and Number of curricula in high school. (Under (1), list by title the various curricula. Write the no. on blank opposite (2).)

(1) Type of Curriculum (Please name)

_____ (a)

_____ (b)

_____ (c)

_____ (d)

_____ (e)

_____ (f)

_____ (g)

_____ (2) Total number of different curricula (Liberal arts + Vocational Agriculture + etc.)

11. Names of all teachers who have part-time or full-time teaching assignments in Industrial Arts, Trade and Industry, and Vocational Agriculture.

	Name of Teacher	Major Teaching Assignment(s)
(1)		
(2)		
(3)		
(4)		
(5)		
(6)		
(7)		
(8)		

12. Financial data. (Please check with Superintendent's Office for these data.)

_____ (1) 1958 Assessed Valuation of School Corporation

_____ (2) 1958-1959 Resident pupils enrolled, Grades 1-12

_____ (3) Assessed Valuation per Resident Pupil Enrolled ((1) divided by (2))

COMMENTS: _____

_____

_____

_____

_____

_____

Signed: _____
School Principal

2/Vo Ed/WNC/ 3-59

Date: _____

PURDUE UNIVERSITY
DIVISION OF EDUCATION

Vocational Education Research Project
Cooperative Project 385 (7784)

Form 3

VOCATIONAL AGRICULTURE TEACHER[1] SELF-ANALYSIS INVENTORY - 1

Note: The directions are included with each of the nine items.

1. Name of School _____

2. Teaching Assignment (Check one)

   _____ (1) Agriculture only, grades 9-12

   _____ (2) Agriculture only, grades 7-12

   _____ (3) Agriculture, grades ____ - ____ plus (Specify other subjects)

   _____

   _____ (4) Other (Specify) _____

3. Educational Training

   _____ (1) Less than a Bachelor's degree

   _____ (2) Bachelor's degree only

   _____ (3) Bachelor's degree plus additional course work

   _____ (4) Master's degree only

   _____ (5) Master's degree plus additional course work

(Note: If you checked either item (1) or (2) in No. 3 above, omit No. 4, and go directly to No. 5.)

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[1] This instrument was designed for use in a study entitled "Vocational Education in Public Schools as Related to Social, Economic, and Technical Trends," financed in part by a contract with the Research Section of the U. S. Office of Education. Professors F. J. Woerdehoff, N. J. Nelson, and J. K. Coster are directors of the project; W. K. Bugher is research associate; and E. S. Wagner and J. H. Grantham are research assistants, all of the Division of Education of Purdue University. This instrument was prepared by the directors of the project, with the assistance of the research associate and research assistants.

4. Subject Areas in which Advanced Education was Pursued. (Note: Course work beyond the Bachelor's) Check all that apply.

_____ (1) Agriculture Science (such as agronomy, forestry, poultry science, etc.)

_____ (2) Agricultural Engineering (such as shop work, farm mechanics, etc.)

_____ (3) Rural Sociology

_____ (4) Agricultural Economics (including farm management and marketing)

_____ (5) Agricultural Education courses

_____ (6) Foundations of Education Courses (such as ed. psychology, history of education, philosophy, measurements, etc.)

_____ (7) Guidance Courses

_____ (8) Advanced Science (such as biochemistry, biology, chemistry, etc.)

_____ (9) Administration Courses

5. Experience. (Give number of years for Numbers (1) and (2). Complete chart for No. (3).)

_____ (1) Total number of years of teaching experience.

_____ (2) Total number of years of teaching experience in present school. (Call this year a full year)

_____ (3) Other adult occupational experience (including military service).

Type (What Kind?)	No. of Years

6. Opinion Estimate of Training and Experience Adequacies.

Note: Please check the position on the scale which in your judgment best describes your adequacy in each area.

Subject Areas	Scale Values				
	Highly Inadequate	Somewhat Inadequate	Adequate	Very Adequate	Highly Adequate
(1) Agricultural Science and Technology					
(2) Agricultural Engineering (Mechanics)					
(3) Rural Sociology					
(4) Ag. Econ., Farm Management & Marketing					
(5) Ag. Education					
(6) Foundations of Education					
(7) Guidance Training					
(8) Advanced Science Training					
(9) Administration					

7. Special Assignments. (List the activities other than classroom teaching in which you have an assignment such as FFA, 4-H Club Work, Assistant Basketball Coach, Home Room Teacher, etc.)

(1) _____

(2) _____

(3) _____

(4) _____

(5) _____

8. Transportation Budget $_____

3/Vo Ed/ WSIC/ 3-59

9. Weekly Assignment. (For each day of the week and for each period of the school day please complete the weekly assignment chart indicating (1) the number of minutes in a period, (2) the number of pupils in in class or activity, and (3) the subject or activity in which engaged.)

Day or Week	Time-Pupil Contacts & Activity	Periods 1	2	3	4	5	6	7	8
Mon.	Length in Minutes								
	Number of Pupils								
	Subject or Activity								
Tues.	Length in Minutes								
	Number of Pupils								
	Subject or Activity								
Wed.	Length in Minutes								
	Number of Pupils								
	Subject or Activity								
Thurs.	Length in Minutes								
	Number of Pupils								
	Subject or Activity								
Fri.	Length in Minutes								
	Number of Pupils								
	Subject or Activity								

3/ Vo Ed/ WSC/ 3-59

Signed: _____
(Teacher)

Date: _____

PURDUE UNIVERSITY
DIVISION OF EDUCATION

Vocational Education Research Project
Cooperative Project 305 (7784)

Form 4

INDUSTRIAL EDUCATION TEACHER[1]
SELF-ANALYSIS INVENTORY - 2

Note: The directions are included with each of the nine items.

1. Name of School_____

2. Teaching Assignment (Check one)

_____ (1) Industrial arts only, grades 9-12

_____ (2) Industrial arts only, grades 7-12

_____ (3) Industrial arts plus Trade and Industrial Education

_____ (4) Industrial arts plus (specify other subjects)_____

_____

_____ (5) Trade and Industrial Education only

_____ (6) Trade and Industrial Education plus (specify other subjects)

_____

_____ (7) Other (Specify)_____

3. Educational Training (Check one)

_____ (1) Less than a Bachelor's degree

_____ (2) Bachelor's degree only

_____ (3) Bachelor's degree plus additional course work

_____ (4) Master's degree only

_____ (5) Master's degree plus additional courses

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[1] This instrument was designed for use in a study entitled "Vocational Education in Public Schools as Related to Social, Economic, and Technical Trends," financed in part by a contract with the Research Section of the U. S. Office of Education. Professors F. J. Woerdehoff, N. J. Nelson, and J. K. Coster are directors of the project, W. K. Bugher is research associate; and E. S. Wagner and J. H. Grantham are research assistants, all of the Division of Education of Purdue University. This instrument was prepared by the directors of the project, with the assistance of the research associate and research assistants.

(Note: If you checked either item (1) or (2) in No. 3 above, omit No. 4 and go directly to No. 5.)

4. Subject Areas in which Advanced Education was Pursued. (Note: Course work beyond the Bachelor's degree) Check all items that apply.

_____ (1) Related Science (Physics, chemistry, mathematics, etc.)

_____ (2) General Economics

_____ (3) Sociology

_____ (4) Industrial Management (such as personnel management, labor relations, etc.)

_____ (5) General Engineering (such as design, mechanical, technical, electronics, etc.)

_____ (6) Advanced Shop Training

_____ (7) Foundations of Education (such as psychology, history of education, philosophy, measurement, etc.)

_____ (8) Guidance

_____ (9) Administration

_____ (10) Industrial Education

5. Experience (Give number for items (1) and (2). Complete chart for No. (3).)

_____ (1) Total number of years of teaching experience

_____ (2) Number of years of experience in present school system

(3) Other adult occupational experience

Type (What Kind?)	No. of Years

6. Opinion Estimate of Training and Experience Adequacies

Note: Please check the position on the scale which in your judgment best describes your adequacy in each area.

Subject Areas	Scale Values				
	Highly Inadequate	Somewhat Inadequate	Adequate	Very Adequate	Highly Adequate
(1) Related Science					
(2) General Economics					
(3) Sociology					
(4) Industrial Management					
(5) General Engineering					
(6) Foundations of Education					
(7) Shop Mechanics					
(8) Guidance					
(9) Administration					
(10) Industrial Education					

7. Special Assignments. (List the other activities in which you have an assignment such as Club Work, Assistant Basketball Coach, Home Room Teacher, etc.)

(1)_____

(2)_____

(3)_____

(4)_____

(5)_____

8. Transportation Budget $_____

9. Weekly Assignment. (For each day of the week and for each period of the school day please complete the weekly assignment chart indicating (1) the number of minutes in a period, (2) the number of pupils in class or activity, and (3) the subject or activity in which engaged.)

Day of Week	Time-Pupil Contacts & Activity	Periods 1	2	3	4	5	6	7	8
Mon.	Length in Minutes								
	Number of Pupils								
	Subject or activity								
Tues.	Length in Minutes								
	Number of Pupils								
	Subject or activity								
Wed.	Length in Minutes								
	Number of Pupils								
	Subject or activity								
Thurs.	Length in Minutes								
	Number of Pupils								
	Subject or activity								
Fri.	Length in Minutes								
	Number of Pupils								
	Subject or activity								

Signed: _____
(Teacher)

Date: _____

a/ Ve 24/ WSC/ 3-59

PURDUE UNIVERSITY
DIVISION OF EDUCATION

Vocational Education Research Project
Cooperative Project No. 385 (7704)

Form 5

VOCATIONAL AGRICULTURE

APPRAISAL OF PURPOSES[1]

INSTRUCTIONS:

To: High School Principals and Vocational Agriculture Teachers in Cooperating Schools.

Subject: Analysis of Purposes of Vocational Agriculture.

The initial step in the U.S. Office of Education - Purdue University study is to determine which of a list of potential purposes of vocational agriculture are accepted as goals of programs currently in operation in public schools. To implement this first step, a list of twenty-five potential purposes of vocational agriculture programs has been developed. The purposes listed herein tend to differ from traditionally stated purposes of vocational agriculture. They have been formulated as an outgrowth of an analysis of present-day trends related to vocational programs. The scope of vocational agriculture inferred from the present list of purposes may be somewhat broader than the scope of the majority of agricultural programs currently in operation in public schools.

Administrators and vocational agriculture teachers in participating schools are requested to select cooperatively the purposes now accepted as goals of vocational agriculture programs in their schools, by rating each of the twenty-five purposes. Please examine the entire list of purposes carefully. Then rate each purpose, individually, in terms of your combined response to this question: To what extent is this purpose currently accepted as a goal of the vocational agriculture program in your school? The degree of acceptance is to be

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S/ Vo Ed/ VEC/ 3-59

indicated by encircling one of five possible responses: No Extent, Limited Extent, Moderate Extent, Considerable Extent, Very Great Extent.

PURPOSES OF VOCATIONAL AGRICULTURE

CODE:	NE—NO EXTENT LE—LIMITED EXTENT ME—MODERATE EXTENT CE—CONSIDERABLE EXTENT VG—VERY GREAT EXTENT	TO WHAT EXTENT IS THIS PURPOSE ACCEPTED AS A GOAL OF YOUR SCHOOL'S VOCATIONAL AGRICULTURE PROGRAM?

	Column	1	2	3	4	5
1.	To assist students in developing an appreciation of the economic contributions of agriculture to society.	NE	LE	ME	CE	VG
2.	To assist students in developing an appreciation for and an understanding of technological developments in agriculture . .	NE	LE	ME	CE	VG
3.	To assist students in developing traits, such as cooperation, industry, and initiative, essential for successful occupational adjustment and human relations.	NE	LE	ME	CE	VG
4.	To assist students in developing the ability to organize and apply technical agricultural knowledge and information to the solution of farm problems	NE	LE	ME	CE	VG
5.	To assist students in developing abilities to maintain, operate, and adjust farm power, machinery, and equipment.	NE	LE	ME	CE	VG
6.	To assist students in developing abilities essential to maintaining healthful and safe conditions on the farm and in the home. .	NE	LE	ME	CE	VG

CODE: NE--NO EXTENT LE--LIMITED EXTENT ME--MODERATE EXTENT CE--CONSIDERABLE EXTENT VG--VERY GREAT EXTENT	TO WHAT EXTENT IS THIS PURPOSE ACCEPTED AS A GOAL IN YOUR SCHOOL'S VOCATIONAL AGRICULTURE PROGRAM?
Column	1 2 3 4 5
7. To assist persons in exploring the redirection of agricultural patterns, practices, and concepts.	NE LE ME CE VG
8. To assist students in developing abilities essential for assuming leadership and citizenship roles	NE LE ME CE VG
9. To assist persons in understanding and interpreting the role of agriculture in society	NE LE ME CE VG
10. To assist students in developing mechanical skills, such as carpentry, welding, and cold metal work, involved in farm improvement and maintenance	NE LE ME CE VG
11. To assist students in developing abilities to understand marketing processes and to market products and services profitably	NE LE ME CE VG
12. To assist students in developing non-mechanical (i.e., manipulative and identification) skills, such as pruning fruit trees, identifying weed seeds, culling hens, involved in farm production and improvement	NE LE ME CE VG
13. To assist persons in critically analyzing the economic requirements essential for establishing and maintaining efficient farming units	NE LE ME CE VG
14. To assist out-of-school youth and adults enter into and/or become more effectively established in farm related occupations	NE LE ME CE VG

CODE: NE—NO EXTENT LE—LIMITED EXTENT ME—MODERATE EXTENT CE—CONSIDERABLE EXTENT VG—VERY GREAT EXTENT	TO WHAT EXTENT IS THIS PURPOSE ACCEPTED AS A GOAL IN YOUR SCHOOL'S VOCATIONAL AGRICULTURE PROGRAM?
Column	1 2 3 4 5
15. To assist students in exploring the possibilities of employment in agricultural occupations.	NE LE ME CE VG
16. To assist persons in developing interests and abilities of an avocational nature (e.g., aesthetic appreciations and leisure time activities, such as landscaping, gardening, and establishing lawns), related to agriculture	NE LE ME CE VG
17. To assist high school students in formulating realistic occupational goals.	NE LE ME CE VG
18. To assist students in developing an appreciation for the place of agriculture in the emerging pattern of American society . . .	NE LE ME CE VG
19. To assist out-of-school youth and adults enter into and/or become more effectively established in farming	NE LE ME CE VG
20. To assist students in developing abilities to organize land, labor, and capital resources into an efficient producing unit .	NE LE ME CE VG
21. To assist high school students in obtaining employment in appropriate agricultural occupations.	NE LE ME CE VG
22. To assist students in developing abilities to procure and utilize efficiently equipment, supplies, and services	NE LE ME CE VG

CODE: NE--NO EXTENT LE--LIMITED EXTENT ME--MODERATE EXTENT CE--CONSIDERABLE EXTENT VG--VERY GREAT EXTENT	TO WHAT EXTENT IS THIS PURPOSE ACCEPTED AS A GOAL OF YOUR SCHOOL'S VOCATIONAL AGRICULTURE PROGRAM?
Column	1 2 3 4 5
23. To assist persons established in farming in adjusting to changing occupational conditions in farming.	NE LE ME CE VG
24. To assist academically talented students in preparing for education beyond the high school level.	NE LE ME CE VG
25. To assist students in developing an understanding of scientific knowledge, concepts, and methods related to agriculture	NE LE ME CE VG

For: _____
(Name of School)

_____
(County)

Persons Responding:

_____

_____

_____

Date: _____ _____

5/ Vo Ed/ WNC/ 3-59

PURDUE UNIVERSITY
DIVISION OF EDUCATION

Vocational Education Research Project
Cooperative Project 385 (7784)

Form 6

VOCATIONAL AGRICULTURE

APPRAISAL OF OPERATIONAL LEVELS[1]

Name of School _____ County _____

Name of Interviewee _____ Name of Interviewer _____

Purposes / Levels of Operation	Rating of Levels of Operation
1. To assist students in developing an appreciation of the economic contributions of agriculture to society...	
A. Direct study and discussion of the economic contributions of agriculture to society	0 1 2 3 4
B. Conduct appropriate studies to determine the economic importance of agriculture in the community	0 1 2 3 4
C. Direct analysis of data from local, state, and national sources to determine present and future importance of economic contributions of agriculture.	0 1 2 3 4

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Purposes / Levels of Operation	Rating of Levels of Operation
2. To assist students in developing an appreciation for and an understanding of technological developments in agriculture.	
A. Direct study and discussion of technological advances in agriculture.	0 1 2 3 4
B. Survey the community to ascertain the extent to which technological advances have been put to use.	0 1 2 3 4
C. Design applications of technological developments to farming or other agricultural conditions	0 1 2 3 4
3. To assist students in developing traits, such as cooperation, industry, and initiative, essential for successful occupational adjustment and human relations.	
A. Direct study and discussion of traits essential for successful occupational adjustment	0 1 2 3 4
B. Provide individual counseling services to assist students in self-analysis and self-improvement.	0 1 2 3 4
C. Initiate group activities to provide opportunities for developing desirable traits	0 1 2 3 4
4. To assist students in developing the ability to organize and apply technical agricultural knowledge and information to the solution of farm problems.	
A. Direct study and discussion of technical agricultural subject matter.	0 1 2 3 4
B. Identify general problems of farmers, and decide on solution of problems in terms of appropriate technical data.	0 1 2 3 4
C. Identify specific problems related to specific farm operations, decide upon a solution, and test and evaluate conclusions under actual or simulated job conditions.	0 1 2 3 4

Purposes — Levels of Operation	Rating of Levels of Operation
5. To assist students in developing abilities to maintain, operate, and adjust farm power machinery and equipment.	
A. Direct study and discussion of the operation, maintenance, and adjustment of farm power, machinery, and equipment.	0 1 2 3 4
B. Provide actual experiences in the operation, adjustment, and maintenance of farm power, machinery, and equipment.	0 1 2 3 4
C. Organize activities to develop understanding of scientific principles related to the operation of farm power, machinery, and equipment.	0 1 2 3 4
6. To assist students in developing abilities essential to maintaining healthful and safe conditions on the farm and in the home.	
A. Direct study and discussion of health and safety practices	0 1 2 3 4
B. Organize activities, integrated with appropriate units, to improve health and safety practices in the classroom and shop	0 1 2 3 4
C. Plan, develop, and carry out a long-range community program to improve health and safety practices on the farm and in the home	0 1 2 3 4
7. To assist persons in exploring the redirection of agricultural patterns, practices, and concepts	
A. Direct study and discussion of new agricultural patterns, practices, and concepts	0 1 2 3 4
B. Demonstrate new agricultural patterns, practices, and concepts in the community	0 1 2 3 4
C. Organize planning groups to implement new agricultural patterns, practices, and concepts	0 1 2 3 4

Purposes — Levels of Operation	Rating of Levels of Operation
8.. To assist students in developing abilities essential for assuming leadership and citizenship roles.	
A. Direct study and discussions of knowledge and skills requisite for successful acceptance of leadership and citizenship roles.	0 1 2 3 4
B. Organize and direct activities to provide experiences in leadership and citizenship responsibilities in the classroom and shop	0 1 2 3 4
C. Plan, develop, and carry out projects to provide direct experiences in leadership and citizenship responsibilities in the school and community	0 1 2 3 4
9. To assist persons in understanding and interpreting the role of agriculture in society .	
A. Give talks, exhibit displays, and otherwise informally interpret agriculture to the school community	0 1 2 3 4
B. Organize an informal education program to interpret agriculture to the community . .	0 1 2 3 4
C. Organize formal programs of instruction, for all age levels, to interpret agriculture to the community.	0 1 2 3 4
10. To assist students in developing mechanical skills, such as carpentry, welding, and cold metal work, involved in farm improvement and maintenance.	
A. Direct study and discussion of mechanical skills needed by farmers	0 1 2 3 4
B. Direct the performance of mechanical skills in the shop.	0 1 2 3 4
C. Direct the application of skills under actual or simulated job conditions	0 1 2 3 4
11. To assist students in developing abilities to understand marketing processes and to market products and services profitably.	
A. Direct study and discussion of farm marketing processes and practices	0 1 2 3 4
B. Analyze existing practices pertaining to marketing farm products and services . .	0 1 2 3 4
C. Plan, develop, and carry out activities to provide practical experiences in marketing products and services	0 1 2 3 4

Purposes / Levels of Operation	Rating of Levels of Operation
12. To assist students in developing non-mechanical (i.e., manipulative and identification) skills, such as pruning fruit trees, identifying weed seeds, and culling hens, involved in farm production and improvement.	
A. Direct study and discussion of manipulative and identification skills.	0 1 2 3 4
B. Direct the performance of skills in laboratory, shop, classroom, or on a farm. . . .	0 1 2 3 4
C. Direct the application of skills under actual or simulated job conditions	0 1 2 3 4
13. To assist persons in critically analyzing the economic requirements essential for establishing and maintaining efficient farming units.	
A. Direct study and discussion of efficient farming units.	0 1 2 3 4
B. Analyze and interpret farm records, and identify efficiency factors affecting farm income	0 1 2 3 4
C. Direct the application of criteria (i.e., efficiency factors) to help beginning or established farmers make independent judgments concerning the economic possibilities of specific farming units.	0 1 2 3 4
14. To assist out-of-school youth and adults to enter into and/or become more effectively established in farm-related occupations.	
A. Organize and conduct formal programs of instruction to help persons become established in farm-related occupations	0 1 2 3 4
B. Hold regular conferences with persons becoming established in farm-related occupations to help work out problems encountered in these occupations.	0 1 2 3 4
C. Organize and conduct intensive and extensive technical courses at post high school levels	0 1 2 3 4

Process / Levels of Operation	Rating of Levels of Operation
15. To assist students in exploring the possibilities of employment in agricultural occupations.	
A. Direct study and discussion of general nature of agricultural occupations.	0 1 2 3 4
B. Survey the community to determine the types of and employment in agricultural occupations in the community	0 1 2 3 4
C. Analyse the nature, training requirements, and current and future demands for agricultural workers at local, state, national, and global levels	0 1 2 3 4
16. To assist persons in developing interests and abilities of an avocational nature (e.g., aesthetic appreciations and leisure time activities, such as landscaping, gardening, and establishing lawns), related to agriculture.	
A. Discuss avocational problems and practices informally with persons in the school community	0 1 2 3 4
B. Organize and conduct topical discussions, for informal group meetings, dealing with avocational abilities related to agriculture. . .	0 1 2 3 4
C. Plan, develop, and carry out instructional programs including special courses and club activities at all age levels, dealing with avocational aspects of agriculture	0 1 2 3 4
17. To assist high school students in formulating realistic occupational goals.	
A. Encourage students who express verbal interest in agriculture to prepare for an agricultural occupation	0 1 2 3 4
B. Determine levels of aptitude and interest in agricultural occupations	0 1 2 3 4
C. Provide try-out and directed work experiences in agricultural occupations	0 1 2 3 4

Purposes / Levels of Operation	Rating of Levels of Operation
18. To assist students in developing an appreciation for the place of agriculture in the emerging pattern of American society.	
A. Direct study and discussion of the cultural patterns of rural communities.	0 1 2 3 4
B. Examine the similarities and differences of cultural patterns in rural and urban communities.	0 1 2 3 4
C. Organize learning experiences to inculcate better understanding between rural and urban groups	0 1 2 3 4
19. To assist out-of-school youth and adults enter into and/or become more effectively established in farming.	
A. Organize and conduct formal programs of instruction to help persons become established in farming	0 1 2 3 4
B. Hold regular conferences with persons becoming established in farming to plan farming operations	0 1 2 3 4
C. Organize and conduct advanced intensive and extensive technical courses, at post high school levels	0 1 2 3 4
20. To assist students in developing abilities to organize land, labor, and capital resources into an efficient producing unit.	
A. Direct study and discuss the theories and practices of farm organization, including farm and soil management, finances, records, and utilization of land resources.	0 1 2 3 4
B. Analyze existing farm operations, and outline alternate patterns of farm organization	0 1 2 3 4
C. Plan, develop, and carry out systematic projects to provide practical experience in organizing the land, labor, and capital resources on a farm.	0 1 2 3 4

Purposes / Levels of Operation	Rating of Levels of Operation
21. To assist high school students in obtaining employment in appropriate agricultural occupations.	
A. Direct study and discussion of placement opportunities in the community.	0 1 2 3 4
B. Survey the community to locate placement opportunities	0 1 2 3 4
C. Assist students in obtaining employment in jobs which utilize particular competencies possessed by students	0 1 2 3 4
22. To assist students in developing abilities to procure and utilize efficiently equipment, supplies, and services.	
A. Direct study and discussion of procurement of farm equipment, supplies, and services.	0 1 2 3 4
B. Analyse existing practices pertaining to procuring and utilizing equipment, supplies, and services.	0 1 2 3 4
C. Plan, develop, and carry out projects to provide practical experience in procuring and utilizing equipment, supplies, and services.	0 1 2 3 4
23. To assist persons established in farming in adjusting to changing occupational conditions in farming.	
A. Organize and conduct formal programs of instruction to help persons, established in farming, adjust to changing agricultural conditions.	0 1 2 3 4
B. Hold regular conferences with persons established in farming to plan farming operations.	0 1 2 3 4
C. Organize and conduct advanced intensive and extensive technical courses, at post high school levels.	0 1 2 3 4

Purposes / Levels of Operation	Rating of Levels of Operation				
24. To assist academically talented students in preparing for education beyond the high school level.					
A. Counsel informally with academically talented students and encourage them to intensify their educational efforts	0	1	2	3	4
B. Provide enriched experiences within regular course offerings, to challenge academically competent students.	0	1	2	3	4
C. Provide advanced courses in agricultural science for prospective college students. .	0	1	2	3	4
25. To assist students in developing an understanding of scientific knowledge, concepts, and methods related to agriculture.					
A. Direct study and discussion of the nature of scientific thought and practice	0	1	2	3	4
B. Develop projects to apply products of scientific practice and thought	0	1	2	3	4
C. Create and design experiments to add to the fund of scientific knowledge	0	1	2	3	4

PURDUE UNIVERSITY
DIVISION OF EDUCATION

Vocational Education Research Project
Cooperative Project 385 (7784)

Form 7

VOCATIONAL AGRICULTURE

APPRAISAL OF RESOURCES [1]

_____
Name of School

_____
County

_____
Address

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[1] This instrument was designed for use in a study entitled "Vocational Education in Public Schools as Related to Social, Economic, and Technical Trends," financed in part by a contract with the Research Section of the U.S. Office of Education. Professors F.J. Woerdehoff, N.J. Nelson, and J.K. Coster are directors of the project; W.K. Bugher is research associate; and E.S. Wagner and J.H. Grantham are research assistants, all of the Division of Education of Purdue University. This instrument was prepared by the directors of the project, with the assistance of the research associate and research assistants.

7/ Vo Ed/ WNC/ 3-59

I. ADEQUACY OF SPACE

Key: 1 - Not Available 2 - Inadequate 3 - Adequate 4 - Very Adequate	Classroom		Laboratory		Shop	
	Main	Aux.	Main	Aux.	Main	Aux.
Reference Items Key	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
1. Area.	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
2. Space Utilization	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
3. General Layout.	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
4. Storage	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
5. Location.	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
6. Environment						
a. Aesthetic	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
b. Thermal	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
c. Visual.	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
d. Safety.	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
e. Functional						
(1) Chalkboard	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
(2) Bulletin Board . .	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
(3) Display Area . . .	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
(4) Use of Visual Aids	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
(5) Electrical Outlets	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
(6) Sink	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
(7) Toilet Facilities.	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
(8) Student Lockers. .	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
7. Other_____	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4

Classroom is:

Classroom Size _____ x _____

Laboratory Size _____ x _____ _____ Used for agriculture only.

Shop Size _____ x _____ _____ Used for other classes.

Shop:

_____ Agricultural Only

_____ Combination Shop

COMMENTS:

II. LIBRARY MATERIALS AND TEACHING PLANS ___Unit; Type of Library Arrangement ___Central; ___Both; ___Professional

Key: 1 - Not Available 2 - Inadequate 3 - Adequate 4 - Very Adequate	Books				Bulletins; Pamphlets; Publication				Newspapers; Periodicals				Plans for Teaching Outlines			
Reference Area — Key	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1. Occupational Information. . . .	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
2. General Agricultural Economics.	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
3. Farm Management	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
4. Marketing	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
5. Rural Sociology	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
6. Crop and Livestock Production .	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
7. Farm Mechanics.	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
8. Agricultural Science (Advanced)	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
9. Trends.	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
10. Research Reports.	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
11. Health and Safety	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
12. Citizenship	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
13. Leadership.	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
14. Avocational	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
15. Standard Reference Lists. . . .	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
16. Other_____	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

III. AUDIO-VISUAL AIDS

Key: 1 - Not Available 2 - Inadequate 3 - Adequate 4 - Very Adequate	Projective Aids				Graphic Aids				Models; Mock-Ups				Specimen			
Reference Area — Key	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1. Occupational Information. . . .	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
2. General Agricultural Economics.	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
3. Farm Management	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
4. Marketing	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
5. Rural Sociology	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
6. Crop and Livestock Production .	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
7. Farm Mechanics.	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
8. Agricultural Science (Advanced)	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
9. Trends.	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
10. Research Reports.	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
11. Health and Safety	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
12. Citizenship	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
13. Leadership.	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
14. Avocational	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
15. Other_____	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

IV. GUIDANCE SERVICES

Key: 1 - Not Available 2 - Inadequate 3 - Adequate 4 - Very Adequate	Counselor	Standardized Test	Records	Occupations or Guidance Classes
Reference Area — Key	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
1. Occupational Selection.	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
2. Placement	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
3. Personal and Social Adjustment.	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
4. Advanced Education.	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
5. Other_____	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4

V. COMMUNITY RESOURCES

Key: 1 - Not Used 2 - Used Little 3 - Used Considerably 4 - Used Extensively	Advisory Committees	Industrial, Business Groups	Gov't. Agencies	Civic Agencies	Mass Media
Reference Items — Key	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
1. Occupational Exploration					
a. In-school	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
b. Out-of-school . . .	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
2. Program Development					
a. In-school	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
b. Out-of-school . . .	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
3. Farm Production					
a. In-school	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
b. Out-of-school . . .	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
4. Marketing and Management					
a. In-school	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
b. Out-of-school . . .	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
5. Farm Mechanics					
a. In-school	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
b. Out-of-school . . .	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
6. Technological Development					
a. In-school	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
b. Out-of-school . . .	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
7. Social Adjustment					
a. In-school	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
b. Out-of-school . . .	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
8. Agricultural Interpretation					
a. In-school	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
b. Out-of-school . . .	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
9. Avocational					
a. In-school	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
b. Out-of-school . . .	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
10. Other_____					
a. In-school	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
b. Out-of-school . . .	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4

VI. RESOURCES FOR PRACTICAL EXPERIENCE

Key: 1 - Not Used
2 - Used Little
3 - Used Considerably
4 - Used Extensively

Reference Area — Key	School Operated Farm	School Controlled Plot	Cooperative Locales (School Directed) On-Farm	Cooperative Locales (School Directed) Farm Rel.
1. Occupational Exploration				
a. In-school	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
b. Out-of-school	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
2. Livestock and Crop Production				
a. In-school	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
b. Out-of-school	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
3. Farm Management				
a. In-school	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
b. Out-of-school	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
4. Marketing				
a. In-school	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
b. Out-of-school	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
5. Procuring				
a. In-school	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
b. Out-of-school	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
6. Farm Mechanics				
a. In-school	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
b. Out-of-school	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
7. Technological Development				
a. In-school	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
b. Out-of-school	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
8. Agricultural Science (Advanced)				
a. In-school	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
b. Out-of-school	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
9. Avocational				
a. In-school	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
b. Out-of-school	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
10. Other_____				
a. In-school	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
b. Out-of-school	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4

VII. TRANSPORTATION

Key: 1 - Not Available
2 - Inadequate
3 - Adequate
4 - Very Adequate

Reference Area — Key	
1. Student transportation (Field Trips, Excursions, etc.)	1 2 3 4
2. Teacher Travel	1 2 3 4
3. Other_____	1 2 3 4

VIII. STUDENT ORGANIZATIONS AND ACTIVITIES

Key: 1 - Not Used 2 - Used Little 3 - Used Considerably 4 - Used Extensively	In-School								Out-of-School			
	Agricultural Organization				Non-Agric. Organization				School Rel. Organizations			
Reference Area Key	1	2	3	4	1	2	3	4	1	2	3	4
1. Agricultural Information . . .	1	2	3	4	1	2	3	4	1	2	3	4
2. General Agricultural Economics	1	2	3	4	1	2	3	4	1	2	3	4
3. Farm Management.	1	2	3	4	1	2	3	4	1	2	3	4
4. Marketing.	1	2	3	4	1	2	3	4	1	2	3	4
5. Procuring.	1	2	3	4	1	2	3	4	1	2	3	4
6. Rural Sociology.	1	2	3	4	1	2	3	4	1	2	3	4
7. Livestock and Crop Production.	1	2	3	4	1	2	3	4	1	2	3	4
8. Farm Mechanics	1	2	3	4	1	2	3	4	1	2	3	4
9. Agricultural Science	1	2	3	4	1	2	3	4	1	2	3	4
10. Health and Safety.	1	2	3	4	1	2	3	4	1	2	3	4
11. Citizenship.	1	2	3	4	1	2	3	4	1	2	3	4
12. Leadership	1	2	3	4	1	2	3	4	1	2	3	4
13. Avocational.	1	2	3	4	1	2	3	4	1	2	3	4
14. Other_____	1	2	3	4	1	2	3	4	1	2	3	4

IX. FARM MECHANICS EQUIPMENT

Key: 1 - Not Available 2 - Inadequate 3 - Adequate 4 - Very Adequate	Hand Tools				Portable Power Tools				Machines				Precision Testing and Measurement			
Reference Area Key	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1. Carpentry	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
2. Welding	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
3. Soldering and Sheet Metal . . .	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
4. Electricity	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
5. Concrete.	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
6. Farm Power.	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
7. Farm Machinery.	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
8. Cold Metal.	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
9. Painting and Glazing.	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
10. Plumbing.	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
11. Other_____	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

X. LABORATORY FACILITIES AND EQUIPMENT

Key: 1 - Not Available
2 - Inadequate
3 - Adequate
4 - Very Adequate

Reference Area — Key					
1. Livestock Production					
a. Posting equipment	1	2	3	4
b. Castration equipment	1	2	3	4
c. Milk tester	1	2	3	4
d. Ear notching equipment	1	2	3	4
e. Dehorning equipment	1	2	3	4
f. Grooming equipment	1	2	3	4
g. Worming equipment	1	2	3	4
h. Egg candling equipment	1	2	3	4
i. Artificial insemination	1	2	3	4
j. Small animal cages	1	2	3	4
k. Other _____	1	2	3	4
l. Other _____	1	2	3	4
2. Crops and Fertilizing				
a. Soil testing kit	1	2	3	4
b. Germination equipment	1	2	3	4
c. Grain grad ng equipment	1	2	3	4
d. Moisture testing equipment	1	2	3	4
e. Plant breeding equipment	1	2	3	4
f. Pruning equipment	1	2	3	4
g. Fertilizer plots	1	2	3	4
h. Variety plots	1	2	3	4
i. Other _____	1	2	3	4
j. Other _____	1	2	3	4
3. Other Laboratory Equipment				
a. Microscope	1	2	3	4
b. Transit and surveying	1	2	3	4
c. Farm chemicals and applicators	1	2	3	4
d. Other _____	1	2	3	4
e. Other _____	1	2	3	4

COMMENTS:

PURDUE UNIVERSITY
School of Science, Education, and Humanities
Division of Education
LAFAYETTE, INDIANA

ANALYSIS OF RESOURCES
VOCATIONAL AGRICULTURE

Form 7A

IDENTIFICATION

1* _____ School _____

2 _____ Number _____

3 _____ Size of Group _____

4 _____ Type of Program _____

5 _____

6 _____

7 _____

8 _____

9 _____

10 _____

FACILITIES

Classroom

11	Size	1	2	3	4	5	6	7
12	Location	1	2	3	4	5	6	7
13	Condition	1	2	3	4	5	6	7
14	Suitability for Vo. Ag.	1	2	3	4	5	6	7

Shop

15	Size	1	2	3	4	5	6	7
16	Location	1	2	3	4	5	6	7
17	Condition	1	2	3	4	5	6	7
18	Suitability of Shop for Vo. Ag.	1	2	3	4	5	6	7

*Numbers pertain to columns on IBM cards.

Laboratory

19	Size	1	2	3	4	5	6	7
20	Location	1	2	3	4	5	6	7
21	Condition	1	2	3	4	5	6	7
22	Suitability for Vo. Ag.	1	2	3	4	5	6	7

23 Classroom Arrangement

____ 1 No classroom.

____ 2 Used for Agricultural classes.

____ 3 Used for Vocational Agriculture and other classes.

____ 4 Used for Vocational Agricultural classes and shop.

24 Shop Arrangement

____ 1 No shop.

____ 2 Vocational Agriculture only.

____ 3 Vocational Agriculture and Industrial Arts Shop Combined.

TEACHING MATERIALS

Library Materials

25	General (1,2,5,9,11,12,13,14)	1	2	3	4	5	6	7
26	Technical (6,8,10)	1	2	3	4	5	6	7
27	Management (3,4)	1	2	3	4	5	6	7
28	Mechanical (7)	1	2	3	4	5	6	7
29	Teaching Outlines	1	2	3	4	5	6	7
30	Projective Aids	1	2	3	4	5	6	7
31	Mock Up, Models, and Specimens	1	2	3	4	5	6	7
32	Availability of Audio-visual Aids	1	2	3	4	5	6	7

Equipment								
33	Classroom Equipment	1	2	3	4	5	6	7
34	Shop Equipment	1	2	3	4	5	6	7
35	Laboratory Equipment	1	2	3	4	5	6	7
OTHER RESOURCES								
Guidance Services								
36	Counseling	1	2	3	4	5	6	7
37	Testing	1	2	3	4	5	6	7
38	Availability of Guidance Services	1	2	3	4	5	6	7
39	Use of Community Resources	1	2	3	4	5	6	7
40	Directed Experience on Privately Owned Farm	1	2	3	4	5	6	7
41	Directed Experience on School Plot or Farm	1	2	3	4	5	6	7
42	Extent of Directed Experience	1	2	3	4	5	6	7
43	Student Organization	1	2	3	4	5	6	7
44	Student Transportation	1	2	3	4	5	6	7
45	Teacher Travel	1	2	3	4	5	6	7

PURDUE UNIVERSITY
DIVISION OF EDUCATION

Vocational Education Research Project
Cooperative Project 385 (7784)

Form 8

INDUSTRIAL EDUCATION

APPRAISAL OF PURPOSES[1]

INSTRUCTIONS:

To: High School Principals and Industrial Arts and/or Trade and Industrial Education Teachers in Cooperating Schools.

Subject: Analysis of Purposes of Industrial Education.

The initial step in the U. S. Office of Education - Purdue University study is to determine which of a list of potential purposes of industrial education (including both industrial arts and trade and industrial education) are accepted as goals of programs currently in operation in public schools. To implement this first step, a list of twenty-three potential purposes of industrial education programs has been developed. The purposes listed herein tend to differ from traditionally stated purposes of industrial education. They have been formulated as an outgrowth of an analysis of present-day trends related to vocational programs. The scope of industrial education inferred from the present list of purposes may be somewhat broader than the scope of the majority of programs currently in operation in public schools.

Administrators and industrial education teachers (including both industrial arts and trade and industrial instructors) in participating schools are requested to select cooperatively the purposes now accepted as goals of industrial education programs in their

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[1] This instrument was designed for use in a study entitled "Vocational Education in Public Schools as Related to Social, Economic, and Technical Trends," financed in part by a contract with the Research Section of the U.S. Office of Education. Professors F.J. Woerdehoff, N.J. Nelson, and J.K. Coster are directors of the project; W.K. Bugher is research associate; and E.S. Wagner and J.H. Grantham are research assistants, all of the Division of Education of Purdue University. This instrument was prepared by the directors of the project, with the assistance of the research associate and research assistants.

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schools, by rating each of the twenty-three purposes. Please examine the entire list of purposes carefully. Then rate each purpose, individually, in terms of your response to this question: To what extent is this purpose currently accepted as a goal of the industrial education program in your school? The degree of acceptance is to be indicated by encircling one of five possible responses: No Extent, Limited Extent, Moderate Extent, Considerable Extent, Very Great Extent.

PURPOSES OF INDUSTRIAL EDUCATION

	CODE: NE--NO EXTENT LE--LIMITED EXTENT ME--MODERATE EXTENT CE--CONSIDERABLE EXTENT VG--VERY GREAT EXTENT	TO WHAT EXTENT IS THIS PURPOSE ACCEPTED AS A GOAL IN YOUR SCHOOL'S INDUSTRIAL EDUCATION PROGRAM?
	Column	1 2 3 4 5
1.	To assist students in developing an appreciation for the social significance of the "world of work".	NE LE ME CE VG
2.	To assist students in developing an understanding of related technical knowledge and information pertaining to industrial occupations.	NE LE ME CE VG
3.	To assist students in developing the ability to select, care for, and use industrial products wisely.	NE LE ME CE VG
4.	To assist students in developing identification skills, such as identifying woods, metals, tools, and parts of equipment, involved in industrial processes.	NE LE ME CE VG
5.	To assist students in developing an appreciation for and an understanding of technological developments in industrial processes	NE LE ME CE VG
6.	To assist students in developing an appreciation for high standards of workmanship	NE LE ME CE VG

CODE: NE--NO EXTENT LE--LIMITED EXTENT ME--MODERATE EXTENT CE--CONSIDERABLE EXTENT VG--VERY GREAT EXTENT	TO WHAT EXTENT IS THIS PURPOSE ACCEPTED AS A GOAL IN YOUR SCHOOL'S INDUSTRIAL EDUCATION PROGRAM?
Column	1 2 3 4 5
7. To assist persons in developing interests and abilities of an avocational nature, such as may be utilized in hobbies and home repair, which are related to industrial occupations.	NE LE ME CE VG
8. To assist high school students in formulating realistic occupational goals. . .	NE LE ME CE VG
9. To assist persons, established as industrial workers, in adjusting to changing needs, goals, and opportunities in industrial occupations.	NE LE ME CE VG
10. To assist currently employed workers in upgrading their level of occupational proficiency	NE LE ME CE VG
11. To assist students in developing abilities essential to maintaining healthful and safe conditions on the job	NE LE ME CE VG
12. To assist students in developing traits such as initiative, cooperation, and resourcefulness, essential for successful occupational human relations	NE LE ME CE VG
13. To assist students in exploring the possibilities of employment in industrial occupations	NE LE ME CE VG
14. To assist students in developing competencies in understanding and utilizing scientific concepts and methods involved in industrial processes.	NE LE ME CE VG

CODE: NE--NO EXTENT LE--LIMITED EXTENT ME--MODERATE EXTENT CE--CONSIDERABLE EXTENT VG--VERY GREAT EXTENT	TO WHAT EXTENT IS THIS PURPOSE ACCEPTED AS A GOAL IN YOUR SCHOOL'S INDUSTRIAL EDUCATION PROGRAM?
Column	1 2 3 4 5
15. To assist academically talented students in preparing for education beyond high school.	NE LE ME CE VG
16. To assist students in developing an appreciation of the economic contributions of industrial workers to society. . . .	NE LE ME CE VG
17. To assist persons in developing a favorable attitude toward industrial occupations and industrial education in the community	NE LE ME CE VG
18. To assist students in developing basic operational skills that apply to a wide range of industrial occupations	NE LE ME CE VG
19. To assist students in developing abilities essential for leadership and citizenship roles	NE LE ME CE VG
20. To assist students in developing abilities to form sound judgments and solve problems related to industrial processes	NE LE ME CE VG
21. To assist students in developing an appreciation and understanding of labor and management relationships	NE LE ME CE VG
22. To assist students in developing specific operational skills essential for initial employment in a specific occupation.	NE LE ME CE VG

CODE: NE--NO EXTENT LE--LIMITED EXTENT ME--MODERATE EXTENT CE--CONSIDERABLE EXTENT VG--VERY GREAT EXTENT	TO WHAT EXTENT IS THIS PURPOSE ACCEPTED AS A GOAL IN YOUR SCHOOL'S INDUSTRIAL EDUCATION PROGRAM?

	Column	1	2	3	4	5
23. To assist high school students in obtaining employment in appropriate industrial occupations.		NE	LE	ME	CE	VG

_____
(Name of School)

_____
(County)

Persons Responding:

_____

_____

_____

_____

Date_____ _____

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PURDUE UNIVERSITY
DIVISION OF EDUCATION

Vocational Education Research Project
Cooperative Project 385 (7784)

Form 9

INDUSTRIAL EDUCATION

APPRAISAL OF OPERATIONAL LEVELS[1]

Name of School _____ County _____

Name of Interviewee _____ Name of Interviewer _____

Purposes / Levels of Operation	Rating of Levels of Operation
1. To assist students in developing an appreciation for the social significance of the "world of work."	
A. Direct study and discussion of the social contributions of the industrial worker to society.	0 1 2 3 4
B. Direct study and analysis of the possibilities for horizontal and vertical advancement in industrial occupations.	0 1 2 3 4
C. Direct study and analysis of the interrelationship between industry and society as a whole.	0 1 2 3 4
2. To assist students in developing an understanding of related technical knowledge and information pertaining to industrial occupations.	
A. Direct study and discussion of related technical knowledge.	0 1 2 3 4
B. Plan, develop, and carry out projects to provide experience in relating technical knowledge to industrial processes and operation.	0 1 2 3 4
C. Create and design experiments to add to the fund of technical knowledge.	0 1 2 3 4

[1] This instrument was designed for use in a study entitled "Vocational Education in Public Schools as Related to Social, Economic, and Technical Trends," financed in part by a contract with the Research

Purposes / Levels of Operation	Rating of Levels of Operation				
3. To assist students in developing the ability to select, care for, and use industrial products wisely.					
A. Study and discuss consumer information in general.	0	1	2	3	4
B. Develop criteria on which to base selection of industrial products	0	1	2	3	4
C. Examine products and compare with established criteria.	0	1	2	3	4
4. To assist students in developing identification skills, such as identifying woods, metals, tools, and parts of equipment, involved in industrial processes.					
A. Direct study and discussion of industrial skills	0	1	2	3	4
B. Direct the performance of skills in the shop	0	1	2	3	4
C. Direct the application of skills under actual or simulated job conditions	0	1	2	3	4
5. To assist students in developing an appreciation for and an understanding of technological developments in industrial processes.					
A. Direct study and discussion of technological developments in industrial occupations	0	1	2	3	4
B. Survey the community to ascertain the extent to which technological developments have been put to use	0	1	2	3	4
C. Design applications of technological developments to industrial processes	0	1	2	3	4

Section of the U. S. Office of Education. Professors F.J. Woerdehoff, N.J. Nelson, and J.K. Coster are directors of the project; W.K. Bugher is research associate; and E.S. Wagner and J.H. Grantham are research assistants, all of the Division of Education of Purdue University. This instrument was prepared by the directors of the project, with the assistance of the research associate and research assistants.

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Purposes / Levels of Operation	Rating of Levels of Operation
6. To assist students in developing an appreciation for high standards of workmanship.	
A. Direct study and discussion of good work habits emphasizing planning of work and quality of performance.	0 1 2 3 4
B. Plan, develop, and carry out projects to develop high standards of workmanship	0 1 2 3 4
C. Measure performance against criteria of satisfactory workmanship typically used in industrial occupations.	0 1 2 3 4
7. To assist persons in developing interests and abilities of an avocational nature, such as may be utilized in hobbies and home repair, which are related to industrial occupations.	
A. Study and discuss the avocational aspects of industrial occupations.	0 1 2 3 4
B. Conduct informal instruction programs such as clubs and activities related to the avocational aspects of industrial occupations. .	0 1 2 3 4
C. Organize formal instruction programs, such as adult classes in woodworking, related to the avocational aspects of industrial education.	0 1 2 3 4
8. To assist high school students in formulating realistic occupational goals.	
A. Encourage students who express verbal interest in industrial occupations to prepare for them.	0 1 2 3 4
B. Determine levels of aptitude and interest in industrial occupations.	0 1 2 3 4
C. Provide try-out and directed work experience in industrial occupations	0 1 2 3 4

Purposes / Levels of Operation	Rating of Levels of Occupation
9. To assist persons established as an industrial worker in adjusting to changing needs, goals, and opportunities in industrial occupations.	
A. Organize and conduct programs of instruction to prepare adults for new or different occupations.	0 1 2 3 4
B. Hold regular conferences with employed workers to assist them in analyzing aptitudes and interests and in planning individual retraining programs	0 1 2 3 4
C. Organize and conduct intensive or extensive courses at post high school levels. . .	0 1 2 3 4
10. To assist currently employed workers in upgrading their level of occupational proficiency.	
A. Organize and conduct programs of instruction to help industrial workers upgrade their occupational level	0 1 2 3 4
B. Hold regular conferences with employed workers to assist in analyzing aptitudes and interests and in planning individual upgrading programs	0 1 2 3 4
C. Organize and conduct intensive or extensive technical courses at post high school levels.	0 1 2 3 4
11. To assist students in developing abilities essential to maintaining healthful and safe conditions on the job.	
A. Direct study and discussion of health and safety practices	0 1 2 3 4
B. Organize learning experiences, integrated with appropriate classes, to improve health and safety practices in the classroom and shop	0 1 2 3 4
C. Plan, develop, and carry out long-range programs to improve health and safety practices on the job and in the community. . .	0 1 2 3 4

Purposes / Levels of Operation	Rating of Levels of Operation
12. To assist students in developing traits such as initiative, cooperation, and resourcefulness, essential for successful occupational adjustments and human relations.	
A. Direct study and discussion of personal traits essential for successful adjustment in industrial occupations.	0 1 2 3 4
B. Provide individual counseling to assist students in self-analysis and self-improvement.	0 1 2 3 4
C. Plan, develop, and carry out group activities to develop traits essential for occupational success.	0 1 2 3 4
13. To assist students in exploring the possibilities of employment in industrial occupations.	
A. Direct study and discussion of the general nature of industrial occupations	0 1 2 3 4
B. Survey the community to determine the types of, and employment in, industrial occupations	0 1 2 3 4
C. Analyze the nature, training requirements, and current and future demands for industrial workers at local, state, national, and global levels	0 1 2 3 4
14. To assist students in developing competencies in understanding and utilizing scientific concepts and methods involved in industrial processes.	
A. Direct study and discussion of the nature of scientific thought and practice.	0 1 2 3 4
B. Plan, develop, and carry out projects to provide experiences in applying the products of scientific thought and practice.	0 1 2 3 4
C. Create and design experiments to add to the fund of scientific knowledge	0 1 2 3 4

Purposes / Levels of Operation	Rating of Levels of Operations
15. To assist academically talented students in preparing for education beyond high school.	
A. Direct study and discussion of opportunities in industrial occupations requiring education beyond high school.	0 1 2 3 4
B. Provide enriched experiences, within regular course offerings, to challenge academically competent students.	0 1 2 3 4
C. Provide advanced courses in industrial education permitting academically talented students to exercise their creative imaginations	0 1 2 3 4
16. To assist students in developing an appreciation of the economic contributions of industrial workers to society.	
A. Direct study and discussion of the economic importance of industrial occupations . . .	0 1 2 3 4
B. Plan, develop, and carry out projects to determine the economic importance of industrial occupations in the community.	0 1 2 3 4
C. Direct the examination and analysis of data from local, state, and national sources to determine present and future importance of the economic contributions of industrial occupations.	0 1 2 3 4
17. To assist persons in creating a favorable attitude toward industrial occupations and education in the community.	
A. Give talks, exhibit displays, or otherwise informally interpret industrial occupations and education to the school and community. .	0 1 2 3 4
B. Organize an informal education program, using a variety of communication media, to interpret industrial occupations and education in the community	0 1 2 3 4
C. Organize formal programs of instruction, for all age levels, designed to interpret industrial occupations and education to the community.	0 1 2 3 4

Purposes — Levels of Operation	Rating of Levels of Operation
18. To assist students in developing basic operational skills that apply to a wide range of industrial occupations.	
A. Direct the performance of hand operations essential for employment in a variety of occupations.	0 1 2 3 4
B. Direct the performance of mechanical operations essential for employment in a variety of occupations.	0 1 2 3 4
C. Direct an analysis of basic operational skills, and assist in developing understandings of their applications to a variety of occupations by providing actual or simulated job conditions.	0 1 2 3 4
19. To assist students in developing abilities essential for leadership and citizenship roles.	
A. Direct study and discussion of the knowledge and skills required for successful acceptance of leadership and citizenship roles.	0 1 2 3 4
B. Plan, develop, and carry out activities to provide experiences in leadership and citizenship responsibilities in the classroom and shop.	0 1 2 3 4
C. Plan, develop, and carry out projects to provide direct experiences in leadership and citizenship responsibilities in the school and community	0 1 2 3 4
20. To assist students in developing abilities to form sound judgments and solve problems related to industrial processes.	
A. Direct study and discussion of typical problems pertaining to simple industrial processes	0 1 2 3 4
B. Plan, develop, and carry out projects, with specific instructions, to provide experiences in working out problems involved in typical industrial processes.	0 1 2 3 4
C. Plan, develop, and carry out projects in actual or simulated job conditions to provide experiences in creating solutions to problems related to industrial processes	0 1 2 3 4

Purposes / Levels of Operation	Rating of Levels of Operation				
21. To assist students in developing an appreciation and an understanding of labor-management relationships.					
A. Direct study and discussion of labor-management relations.	0	1	2	3	4
B. Plan, develop, and carry out surveys of the community to determine labor-management problems.	0	1	2	3	4
C. Structure simulated problems in labor-management relationships to provide experiences in arriving at possible solutions.	0	1	2	3	4
22. To assist students in developing specific operational skills essential for initial employment in a specific occupation.					
A. Direct the performance of the hand operations essential for employment in specific occupations.	0	1	2	3	4
B. Direct the performance of the mechanical operations essential for employment in specific occupations.	0	1	2	3	4
C. Direct an analysis of the basic operational skills and develop an understanding of their application to industrial occupations by providing actual or simulated job conditions. .	0	1	2	3	4
23. To assist high school students in obtaining employment in appropriate industrial occupations.					
A. Direct study and discussion of the placement opportunities in the community. . . .	0	1	2	3	4
B. Plan, develop, and carry out surveys of the community to locate placement opportunities	0	1	2	3	4
C. Assist students in obtaining employment in jobs which utilize particular competencies possessed by the students.	0	1	2	3	4

PURDUE UNIVERSITY
DIVISION OF EDUCATION

Vocational Education Research Project
Cooperative Project 385 (7784)

Form 10

INDUSTRIAL EDUCATION

APPRAISAL OF RESOURCES [1]

_____
Name of School

_____
County

_____
Address

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[1] This instrument was designed for use in a study entitled "Vocational Education in Public Schools as Related to Social, Economic, and Technical Trends," financed in part by a contract with the Research Section of the U.S. Office of Education. Professors F.J. Woerdehoff, N.J. Nelson, and J.K. Coster are directors of the project; W.K. Bugher is research associate; and E.S. Wagner and J.H. Grantham are research assistants, all of the Division of Education of Purdue University. This instrument was prepared by the directors of the project, with the assistance of the research associate and research assistants.

I. ADEQUACY OF SPACE

Key: 1 - Not Available
2 - Inadequate
3 - Adequate
4 - Very Adequate

Reference Items	Classroom		Laboratory		Shop	
	Main	Aux.	Main	Aux.	Main	Aux.
	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
1. Area	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
2. Space Utilization	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
3. General Layout	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
4. Location	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
5. Storage	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
6. Environment						
a. Aesthetic	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
b. Thermal	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
c. Visual	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
d. Safety	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
e. Functional						
(1) Chalkboard	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
(2) Bulletin Board	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
(3) Display Area	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
(4) Use of Visual Aids	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
(5) Electrical Outlets	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
(6) Sink	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
(7) Toilet Facilities	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
(8) Student Lockers	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
7. Other _____	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4

Classroom Size _____ x _____

Laboratory Size _____ x _____

Shop Size _____ x _____

Classroom is:

_____ Used for industrial education only.

_____ Used for other classes.

Type of Shop:

_____ General Shop

_____ Unit Shop

_____ Unit-General Shop

_____ Combination Industrial Arts and Agriculture Shop

COMMENTS:

II. LIBRARY MATERIALS AND TEACHING PLANS ___Unit;___Central;___Both;___Professional

Type of Library Arrangement

Key: 1 - Not Available 2 - Inadequate 3 - Adequate 4 - Very Adequate		Books				Bulletins; Pamphlets; Publications				Newspapers; Periodicals				Plans for Teaching Outlines			
Reference Area	Key	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1. Occupational Information. .		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
2. Trends.		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
3. Research Reports.		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
4. Health and Safety		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
5. Citizenship		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
6. Leadership.		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
7. Avocational		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
8. Standard Reference.		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
9. Economics		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
10. Industrial Sociology. . . .		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
11. Industrial Psychology . . .		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
12. Arts and Crafts		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
13. Auto Mechanics.		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
14. Building Trades		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
15. Drafting.		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
16. Electricity		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
17. Electronics		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
18. Foundry		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
19. Graphic Arts.		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
20. Machine Shop.		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
21. Power and Transportation. .		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
22. Printing.		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
23. Sheetmetal.		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
24. Welding		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
25. Woodworking		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
26. Other_____		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

III. AUDIO-VISUAL AIDS

Key: 1 - Not Available 2 - Inadequate 3 - Adequate 4 - Very Adequate	Projective Aids	Graphic Aids	Models; Mock-Ups	Specimen
Reference Area — Key	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
1. Occupational Information		1 2 3 4		
2. Trends		1 2 3 4		
3. Research Report		1 2 3 4		
4. Health and Safety		1 2 3 4		
5. Citizenship		1 2 3 4		
6. Leadership		1 2 3 4		
7. Avocational		1 2 3 4		
8. Economics		1 2 3 4		
9. Industrial Sociology		1 2 3 4		
10. Industrial Psychology		1 2 3 4		
11. Arts and Crafts		1 2 3 4	1 2 3 4	1 2 3 4
12. Auto Mechanics		1 2 3 4	1 2 3 4	1 2 3 4
13. Building Trades		1 2 3 4	1 2 3 4	1 2 3 4
14. Drafting		1 2 3 4	1 2 3 4	1 2 3 4
15. Electricity		1 2 3 4	1 2 3 4	1 2 3 4
16. Electronics		1 2 3 4	1 2 3 4	1 2 3 4
17. Foundry		1 2 3 4	1 2 3 4	1 2 3 4
18. Graphic Arts		1 2 3 4	1 2 3 4	1 2 3 4
19. Machine Shop		1 2 3 4	1 2 3 4	1 2 3 4
20. Power and Transportation		1 2 3 4	1 2 3 4	1 2 3 4
21. Printing		1 2 3 4	1 2 3 4	1 2 3 4
22. Sheet Metal		1 2 3 4	1 2 3 4	1 2 3 4
23. Welding		1 2 3 4	1 2 3 4	1 2 3 4
24. Woodworking		1 2 3 4	1 2 3 4	1 2 3 4
25. Other_____		1 2 3 4	1 2 3 4	1 2 3 4

IV. GUIDANCE SERVICES

Key: 1 - Not Available 2 - Inadequate 3 - Adequate 4 - Very Adequate	Counselor	Standardized Tests	Records	Occupations or Guidance Classes
Reference Area — Key	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
1. Occupational Selection				
2. Placement				
3. Personal and Social Adjustment				
4. Advanced Education				
5. Other_____				

V. COMMUNITY RESOURCES

Key: 1 - Not Used 3 - Used Considerably 2 - Used Little 4 - Used Extensively	Advisory Committee	Industrial, Business Groups	Gov't. Agencies	Civic Agencies	Mass Media
Reference Area Key	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
1. Occupational Exploration					
a. In-school	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
b. Out-of-school	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
2. Program Development					
a. In-school					
b. Out-of-school					
3. Technological Development					
a. In-school					
b. Out-of-school					
4. Social Adjustment					
a. In-school					
b. Out-of-school					
5. Industrial Education Interpretation					
a. In-school					
b. Out-of-school					
6. Avocational					
a. In-school					
b. Out-of-school					
7. Industrial Management					
a. In-school					
b. Out-of-school					
8. Other _____					
a. In-school					
b. Out-of-school					

VI. SPECIAL RESOURCES FOR PRACTICAL EXPERIENCE

Key: 1 - Not Used 3 - Used Considerably
2 - Used Little 4 - Used Extensively

Reference Area — Key	School Operated Production	School Directed Work Experience
1. Occupational Exploration		
a. In-school	1 2 3 4	1 2 3 4
b. Out-of-school	1 2 3 4	1 2 3 4
2. Production Skills		
a. In-school	1 2 3 4	1 2 3 4
b. Out-of-school	1 2 3 4	1 2 3 4
3. Operational Skills		
a. In-school	1 2 3 4	1 2 3 4
b. Out-of-school	1 2 3 4	1 2 3 4
4. Technological Development		
a. In-school	1 2 3 4	1 2 3 4
b. Out-of-school	1 2 3 4	1 2 3 4
5. Upgrading		
a. In-school	1 2 3 4	1 2 3 4
b. Out-of-school	1 2 3 4	1 2 3 4
6. Adjustment		
a. In-school	1 2 3 4	1 2 3 4
b. Out-of-school	1 2 3 4	1 2 3 4
7. Problem Solving		
a. In-school	1 2 3 4	1 2 3 4
b. Out-of-school	1 2 3 4	1 2 3 4
8. Other _____		
a. In-school	1 2 3 4	1 2 3 4
b. Out-of-school	1 2 3 4	1 2 3 4

VII. STUDENT ORGANIZATIONS AND ACTIVITIES

Key: 1 - Not Used 3 - Used Considerably
2 - Used Little 4 - Used Extensively

Reference Area — Key	In-School	Out-of-School
	I A Club	School Related Organizations
1. Industrial Education	1 2 3 4	1 2 3 4
2. Health and Safety	1 2 3 4	1 2 3 4
3. Citizenship	1 2 3 4	1 2 3 4
4. Leadership	1 2 3 4	1 2 3 4
5. Avocational	1 2 3 4	1 2 3 4
6. Other _____	1 2 3 4	1 2 3 4

VIII. TRANSPORTATION

Key: 1 - Not Available 3 - Adequate
2 - Inadequate 4 - Very Adequate

Reference Area	Key				
1. Student Transportation (Field trips, excursions, etc.). . . .	1	2	3	4	
2. Teacher Travel (Allowance or car provided).	1		3	4	
3. Other_____.	1		3	4	

IX. TOOLS AND EQUIPMENT

Key: 1 - Not Available
2 - Inadequate
3 - Adequate
4 - Very Adequate

Reference Area	Key	Hand Tools	Power Tools	Precision Tools	Equipment
1. Arts and Crafts		1 2 3 4	1 2 3 4		1 2 3 4
2. Auto Mechanics.		1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
3. Building Trades					
a. Block and Brick Laying.		1 2 3 4		1 2 3 4	1 2 3 4
b. Carpentry		1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
c. Concrete.		1 2 3 4		1 2 3 4	1 2 3 4
d. Electricity		1 2 3 4			
e. Excavation and Layout .		1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
f. Painting.		1 2 3 4	1 2 3 4		1 2 3 4
g. Plastering.		1 2 3 4			1 2 3 4
h. Plumbing.		1 2 3 4	1 2 3 4		1 2 3 4
4. Drafting.		1 2 3 4	1 2 3 4		1 2 3 4
5. Electricity		1 2 3 4			1 2 3 4
6. Electronics		1 2 3 4		1 2 3 4	1 2 3 4
7. Foundry		1 2 3 4			1 2 3 4
8. Graphic Arts.		1 2 3 4			1 2 3 4
9. Machine Shop.		1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
10. Power and Transportation.		1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
11. Printing.		1 2 3 4			1 2 3 4
12. Sheetmetal.		1 2 3 4	1 2 3 4		1 2 3 4
13. Welding		1 2 3 4			1 2 3 4
14. Woodworking		1 2 3 4	1 2 3 4		1 2 3 4
15. Other _____		1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4

PURDUE UNIVERSITY
School of Science, Education, and Humanities
Division of Education
LAFAYETTE, INDIANA

ANALYSIS OF RESOURCES
INDUSTRIAL EDUCATION

Form 10A

IDENTIFICATION

1* _____ School _____

2 _____ Number _____

3 _____ Size of Group _____

4 _____ Type of Program _____

5 _____ Area of Instruction _____

6 _____

7 _____

8 _____

9 _____

10 _____

FACILITIES

Classroom

11	Size	1	2	3	4	5	6	7
12	Location	1	2	3	4	5	6	7
13	Condition	1	2	3	4	5	6	7
14	Suitability for Ind. Ed.	1	2	3	4	5	6	7

Shop

15	Size	1	2	3	4	5	6	7
16	Location	1	2	3	4	5	6	7
17	Condition	1	2	3	4	5	6	7
18	Suitability of Shop for Ind. Ed.	1	2	3	4	5	6	7

*Numbers pertain to columns on IBM cards.

Laboratory

19	Size	1	2	3	4	5	6	7
20	Location	1	2	3	4	5	6	7
21	Condition	1	2	3	4	5	6	7
22	Suitability for Ind. Ed.	1	2	3	4	5	6	7

23 Classroom Arrangement

____ 1 No classroom.

____ 2 Used for general or vocational classes only.

____ 3 Used for both general and vocational classes.

____ 4 Used for industrial education and other classes.

____ 5 Classroom combined with shop.

24 Shop Arrangement

____ 1 Separate shops for industrial arts and vocational classes.

____ 2 Unit and general shops combined.

____ 3 General shop only.

____ 4 Industrial shop combined with agricultural shop.

TEACHING MATERIALS

Library Materials

25	General (1-11)	1	2	3	4	5	6	7
26	Technical (12-26)	1	2	3	4	5	6	7
27	Teaching Outlines	1	2	3	4	5	6	7
28	Projective Aids	1	2	3	4	5	6	7
29	Mock Up, Models, and Specimens	1	2	3	4	5	6	7
30	Availability of Audio-visual Aids	1	2	3	4	5	6	7

Equipment

31	Classroom Equipment	1	2	3	4	5	6	7
32	Small Tool Equipment	1	2	3	4	5	6	7
33	Large Tool Equipment	1	2	3	4	5	6	7
34	General Suitability	1	2	3	4	5	6	7

OTHER RESOURCES

Guidance Services

35	Counseling	1	2	3	4	5	6	7
36	Testing	1	2	3	4	5	6	7
37	Availability of Guidance Services	1	2	3	4	5	6	7
38	Use of Community Resources	1	2	3	4	5	6	7
39	Extent of Directed Experiences Outside of Shop	1	2	3	4	5	6	7
40	Student Organization	1	2	3	4	5	6	7
41	Student Transportation	1	2	3	4	5	6	7
42	Teacher Travel	1	2	3	4	5	6	7

PURDUE UNIVERSITY
DIVISION OF EDUCATION

Vocational Education Research Project
Cooperative Project No. 385 (7784)

Form 11

RATING OF PURPOSES VOCATIONAL AGRICULTURE

DIRECTIONS:

On the basis of an analysis of pertinent social, economic, and technical trends and a review of literature on purposes of vocational agriculture, a suggested list of 25 purposes of vocational agriculture was prepared. As a member of the selected jury, we are asking you to complete this instrument which solicits your opinion of the importance of these purposes.

To assist you in completing this instrument, we have enclosed a brochure entitled, "An Abstract of the Analysis of Social, Economic, and Technical Trends Related to Vocational Education." After reviewing the summary of the data found in the enclosed brochure, please complete this instrument using the rating scale illustrated below.

NI		LI		MI		CI		VG
1	2	3	4	5	6	7	8	9
No Importance		Limited Importance		Moderate Importance		Considerable Importance		Very Great Importance

The nine point scale provides you with an opportunity to indicate your judgment concerning the importance of each purpose on a continuum ranging from "No Importance" to "Very Great Importance." To illustrate, if you believe that purpose No. 1, for example, should be rated between "Limited Importance" and "Moderate Importance", you would circle No. 4 ((4)).

Please return the completed instrument in the self-addressed, stamped envelope provided for this purpose. Your cooperation is greatly appreciated.

Frank J. Woerdehoff
Norbert J. Nelson
John K. Coster

Note: The brochure enclosed with this instrument may be retained for your files. If you desire an additional copy of the instrument, Rating of Purposes, Vocational Agriculture, kindly request same.

CODE: NI: NO IMPORTANCE
LI: LIMITED IMPORTANCE
MI: MODERATE IMPORTANCE
CI: CONSIDERABLE IMPORTANCE
VG: VERY GREAT IMPORTANCE

RATE THE IMPORTANCE OF EACH PURPOSE FOR VOCATIONAL AGRICULTURE IN RELATION TO SOCIETAL TRENDS.

PURPOSES	NI 1	2	LI 3	4	MI 5	6	CI 7	8	VG 9
1. To assist students in developing an appreciation of the economic contributions of agriculture to society.	1	2	3	4	5	6	7	8	9
2. To assist students in developing an appreciation for and an understanding of technological developments in agriculture	1	2	3	4	5	6	7	8	9
3. To assist students in developing traits, such as cooperation, industry, and initiative, essential for successful occupational adjustment and human relations . .	1	2	3	4	5	6	7	8	9
4. To assist students in developing the ability to organize and apply technical agricultural knowledge and information to the solution of farm problems	1	2	3	4	5	6	7	8	9
5. To assist students in developing abilities to maintain, operate, and adjust farm power, machinery, and equipment.	1	2	3	4	5	6	7	8	9
6. To assist students in developing abilities essential to maintaining healthful and safe conditions on the farm and in the home. . .	1	2	3	4	5	6	7	8	9
7. To assist persons in exploring the redirection of agricultural patterns, practices, and concepts	1	2	3	4	5	6	7	8	9
8. To assist students in developing abilities essential for assuming leadership and citizenship roles	1	2	3	4	5	6	7	8	9

CODE: NI: NO IMPORTANCE
LI: LIMITED IMPORTANCE
MI: MODERATE IMPORTANCE
CI: CONSIDERABLE IMPORTANCE
VG: VERY GREAT IMPORTANCE

RATE THE IMPORTANCE OF EACH PURPOSE FOR VOCATIONAL AGRICULTURE IN RELATION TO SOCIETAL TRENDS.

PURPOSES	NI 1	2	LI 3	4	MI 5	6	CI 7	8	VG 9
9. To assist persons in understanding and interpreting the role of agriculture in society	1	2	3	4	5	6	7	8	9
10. To assist students in developing mechanical skills, such as carpentry, welding, and cold metal work, involved in farm improvement and maintenance	1	2	3	4	5	6	7	8	9
11. To assist students in developing abilities to understand marketing processes and to market products and services profitably.	1	2	3	4	5	6	7	8	9
12. To assist students in developing non-mechanical (i.e., manipulative and identification) skills, such as pruning fruit trees, identifying weed seeds, and culling hens, involved in farm production and improvement	1	2	3	4	5	6	7	8	9
13. To assist persons in critically analyzing the economic requirements essential for establishing and maintaining efficient farming units.	1	2	3	4	5	6	7	8	9
14. To assist out-of-school youth and adults enter into and/or become more effectively established in farm-related occupations.	1	2	3	4	5	6	7	8	9
15. To assist students in exploring the possibilities of employment in agricultural occupations . . .	1	2	3	4	5	6	7	8	9

CODE: NI: NO IMPORTANCE
LI: LIMITED IMPORTANCE
MI: MODERATE IMPORTANCE
CI: CONSIDERABLE IMPORTANCE
VG: VERY GREAT IMPORTANCE

RATE THE IMPORTANCE OF EACH PURPOSE FOR VOCATIONAL AGRICULTURE IN RELATION TO SOCIETAL TRENDS.

PURPOSES	NI 1	2	LI 3	4	MI 5	6	CI 7	8	VG 9
16. To assist persons in developing interests and abilities of an avocational nature (e.g.,aesthetic appreciations and leisure time activities, such as landscaping, gardening, and establishing lawns), related to agriculture .	1	2	3	4	5	6	7	8	9
17. To assist high school students in formulating realistic occupational goals	1	2	3	4	5	6	7	8	9
18. To assist students in developing an appreciation for the place of agriculture in the emerging pattern of American society	1	2	3	4	5	6	7	8	9
19. To assist out-of-schools youth and adults enter into and/or become more effectively established in farming.	1	2	3	4	5	6	7	8	9
20. To assist students in developing abilities to organize land, labor, and capital resources into an efficient producing unit. . .	1	2	3	4	5	6	7	8	9
21. To assist high school students in obtaining employment in appropriate agricultural occupations.	1	2	3	4	5	6	7	8	9
22. To assist students in developing abilities to procure and utilize efficiently equipment, supplies, and services	1	2	3	4	5	6	7	8	9

CODE: NI: NO IMPORTANCE
LI: LIMITED IMPORTANCE
MI: MODERATE IMPORTANCE
CI: CONSIDERABLE IMPORTANCE
VG: VERY GREAT IMPORTANCE

RATE THE IMPORTANCE OF EACH PURPOSE FOR VOCATIONAL AGRICULTURE IN RELATION TO SOCIETAL TRENDS.

PURPOSES	NI		LI		MI		CI		VG
	1	2	3	4	5	6	7	8	9
23. To assist persons established in farming in adjusting to changing occupational conditions in farming.	1	2	3	4	5	6	7	8	9
24. To assist academically talented students in preparing for education beyond the high school level	1	2	3	4	5	6	7	8	9
25. To assist students in developing an understanding of scientific knowledge, concepts, and methods related to agriculture	1	2	3	4	5	6	7	8	9

COMMENTS:

PURDUE UNIVERSITY
DIVISION OF EDUCATION

Vocational Education Research Project
Cooperative Project No. 385 (7784)

Form 12

RATING OF PURPOSES INDUSTRIAL EDUCATION

DIRECTIONS:

On the basis of an analysis of pertinent social, economic, and technical trends and a review of literature on purposes of industrial education, a suggested list of 23 purposes of industrial education was prepared. As a member of the selected jury, we are asking you to complete this instrument which solicits your opinion of the importance of these purposes.

To assist you in completing this instrument, we have enclosed a brochure entitled, "An Abstract of the Analysis of Social, Economic, and Technical Trends Related to Vocational Education." After reviewing the summary of the data found in the enclosed brochure, please complete this instrument using the rating scale illustrated below.

NI		LI		MI		CI		VG
1	2	3	4	5	6	7	8	9
No Importance		Limited Importance		Moderate Importance		Considerable Importance		Very Great Importance

The nine point scale provides you with an opportunity to indicate your judgment concerning the importance of each purpose on a continuum ranging from "No Importance" to "Very Great Importance." To illustrate, if you believe that purpose No. 1, for example, should be rated between "Limited Importance" and "Moderate Importance", you would circle No. 4 ((4)).

Please return the completed instrument in the self-addressed, stamped envelope provided for this purpose. Your cooperation is greatly appreciated.

Frank J. Woerdehoff
Norbert J. Nelson
John K. Coster

Note: The brochure enclosed with this instrument may be retained for your files. If you desire an additional copy of the instrument, Rating of Purposes, Industrial Education, kindly request same.

CODE: NI: NO IMPORTANCE
LI: LIMITED IMPORTANCE
MI: MODERATE IMPORTANCE
CI: CONSIDERABLE IMPORTANCE
VG: VERY GREAT IMPORTANCE

RATE THE IMPORTANCE OF EACH PURPOSE FOR INDUSTRIAL EDUCATION IN RELATION TO SOCIETAL TRENDS.

PURPOSES	NI 1	2	LI 3	4	MI 5	6	CI 7	8	VG 9
1. To assist students in developing an appreciation for the social significance of the "world of work".	1	2	3	4	5	6	7	8	9
2. To assist students in developing an understanding of related technical knowledge and information pertaining to industrial occupations.	1	2	3	4	5	6	7	8	9
3. To assist students in developing the ability to select, care for, and use industrial products wisely	1	2	3	4	5	6	7	8	9
4. To assist students in developing identification skills, such as identifying woods, metals, tools, and parts of equipment, involved in industrial processes.	1	2	3	4	5	6	7	8	9
5. To assist students in developing an appreciation for and an understanding of technological developments in industrial processes.	1	2	3	4	5	6	7	8	9
6. To assist students in developing an appreciation for high standards of workmanship	1	2	3	4	5	6	7	8	9
7. To assist persons in developing interests and abilities of an avocational nature, such as may be utilized in hobbies and home repair, which are related to industrial occupations	1	2	3	4	5	6	7	8	9

CODE: NI: NO IMPORTANCE
LI: LIMITED IMPORTANCE
MI: MODERATE IMPORTANCE
CI: CONSIDERABLE IMPORTANCE
VG: VERY GREAT IMPORTANCE

RATE THE IMPORTANCE OF EACH PURPOSE FOR INDUSTRIAL EDUCATION IN RELATION TO SOCIETAL TRENDS.

PURPOSES	NI 1	2	LI 3	4	MI 5	6	CI 7	8	VG 9
8. To assist high school students in formulating realistic occupational goals	1	2	3	4	5	6	7	8	9
9. To assist persons, established as industrial workers, in adjusting to changing needs, goals, and opportunities in industrial occupations	1	2	3	4	5	6	7	8	9
10. To assist currently employed workers in upgrading their level of occupational proficiency	1	2	3	4	5	6	7	8	9
11. To assist students in developing abilities essential to maintaining healthful and safe conditions on the job	1	2	3	4	5	6	7	8	9
12. To assist students in developing traits such as initiative, cooperation, and resourcefulness, essential for successful occupational human relations	1	2	3	4	5	6	7	8	9
13. To assist students in exploring the possibilities of employment in industrial occupations. . . .	1	2	3	4	5	6	7	8	9
14. To assist students in developing competencies in understanding and utilizing scientific concepts and methods involved in industrial processes.	1	2	3	4	5	6	7	8	9
15. To assist academically talented students in preparing for education beyond high school.	1	2	3	4	5	6	7	8	9

CODE: NI: NO IMPORTANCE
LI: LIMITED IMPORTANCE
MI: MODERATE IMPORTANCE
CI: CONSIDERABLE IMPORTANCE
VG: VERY GREAT IMPORTANCE

RATE THE IMPORTANCE OF EACH PURPOSE FOR INDUSTRIAL EDUCATION IN RELATION TO SOCIETAL TRENDS.

PURPOSES	NI 1	2	LI 3	4	MI 5	6	CI 7	8	VG 9
16. To assist students in developing an appreciation of the economic contributions of industrial workers to society.	1	2	3	4	5	6	7	8	9
17. To assist persons in developing a favorable attitude toward industrial occupations and industrial education in the community	1	2	3	4	5	6	7	8	9
18. To assist students in developing basic operational skills that apply to a wide range of industrial occupations.	1	2	3	4	5	6	7	8	
19. To assist students in developing abilities essential for leadership and citizenship roles . . .	1	2	3	4	5	6	7	8	9
20. To assist students in developing abilities to form sound judgments and solve problems related to industrial processes	1	2	3	4	5	6	7	8	9
21. To assist students in developing an appreciation and an understanding of labor-management relationships.	1	2	3	4	5	6	7	8	9
22. To assist students in developing specific operational skills essential for initial employment in a specific occupation.	1	2	3	4	5	6	7	8	9
23. To assist high school students in obtaining employment in appropriate industrial occupations. .	1	2	3	4	5	6	7	8	9

COMMENTS:

PURDUE UNIVERSITY
DIVISION OF EDUCATION

Vocational Education Research Project
Cooperative Project No. 385 (7784)

Form 13

APPRAISAL OF OPERATIONAL LEVELS VOCATIONAL AGRICULTURE

DIRECTIONS:

This instrument contains a list of 25 purposes of vocational agriculture, and for each purpose, a series of three statements describing levels of operations appropriate for attaining the purpose. The three statements are designated as Levels A, B, and C.

We would like for you to appraise the relative importance of each level of operation for each purpose. After you have read the purposes and the three statements, indicate on a scale of 1 to 10 the value you would assign a school operating at Level A (only) by encircling a number on the scale to the right of statement "A." Then indicate the value you would assign a school operating at Levels A plus B, and encircle the number at the right of statement "B." Thirdly, indicate the value you would assign a school operating at Levels A plus B plus C, and encircle the number at the right of statement "C." Assume, in your ratings, that the school is operating effectively at each appropriate level.

Please note that the effect of your ratings will be cumulative, and the differentials in ratings represent the increments you would add to a school's score for each additional level of operation. The following example demonstrates the procedure:

Purpose: To assist students in developing laboratory skills.

A.	Direct study and discussion of laboratory skills.	A 1 (2) 3 4 5 6 7 8 9 0
B.	Demonstrate laboratory skills in the classroom or laboratory	AB 1 2 3 4 (5) 6 7 8 9 0
C.	Direct students in actual performance of laboratory skills through experiments and projects.	ABC 1 2 3 4 5 6 7 8 9 (0)

The above ratings indicate that the rater assigned a relatively low score to discussion of skills and only a modest increment for demonstration, although he rated demonstration higher than discussion. His greatest increment is reserved for schools which provide actual experience in developing laboratory skills.

The purpose and operational levels were constructed after an analysis of trends and opinions related to vocational education. The basic data is given in the enclosed brochure entitled, "An Abstract of the Analysis of Social, Economic, and Technical Trends and Opinions Related to Vocational Education." Since we are concerned with obtaining ratings of operational levels in terms of the types of educational programs that should be offered if schools are to reflect contemporary conditions and trends of society, it is desirable that the brochure be consulted briefly prior to rating the levels of operations.

Please return the completed instrument in the self-addressed, stamped envelope provided for this purpose. Your cooperation is greatly appreciated

Frank J. Woerdehoff
Norbert J. Nelson
John K. Coster

Note: The brochure may be retained for your files. If you desire a copy of this instrument for your own use, please request, Appraisal of Operational Levels, Vocational Agriculture.

	ENCIRCLE THE SCORE YOU WOULD ASSIGN A SCHOOL OPERATING AT LEVELS A, AB, AND ABC.
1. To assist students in developing an appreciation of the economic contributions of agriculture to society.	
A. Direct study and discussion of the economic contributions of agriculture to society	A 1 2 3 4 5 6 7 8 9 0
B. Conduct appropriate studies to determine the economic importance of agriculture in the community	AB 1 2 3 4 5 6 7 8 9 0
C. Direct analysis of data from local, state, and national sources to determine present and future importance of economic contributions of agriculture. . . .	ABC 1 2 3 4 5 6 7 8 9 0

	ENCIRCLE THE SCORE YOU WOULD ASSIGN A SCHOOL OPERATING AT LEVELS A, AB, AND ABC.
2. To assist students in developing an appreciation for and an understanding of technological developments in agriculture.	
A. Direct study and discussion of technological advances in agriculture.	A 1 2 3 4 5 6 7 8 9 0
B. Survey the community to ascertain the extent to which technological advances have been put to use	AB 1 2 3 4 5 6 7 8 9 0
C. Design applications of technological developments to farming or other agricultural conditions.	ABC 1 2 3 4 5 6 7 8 9 0
3. To assist students in developing traits, such as cooperation, industry, and initiative, essential for successful occupational adjustment and human relations.	
A. Direct study and discussion of traits essential for successful occupational adjustment. . .	A 1 2 3 4 5 6 7 8 9 0
B. Provide individual counseling services to assist students in self-analysis and self-improvement	AB 1 2 3 4 5 6 7 8 9 0
C. Initiate group activities to provide opportunities for developing desirable traits	ABC 1 2 3 4 5 6 7 8 9 0
4. To assist students in developing the ability to organize and apply technical agricultural knowledge and information to the solution of farm problems.	
A. Direct study and discussion of technical agricultural subject matter	A 1 2 3 4 5 6 7 8 9 0
B. Identify general problems of farmers, and decide on solution of problems in terms of appropriate technical data.	AB 1 2 3 4 5 6 7 8 9 0

	ENCIRCLE THE SCORE YOU WOULD ASSIGN A SCHOOL OPERATING AT LEVELS A, AB, AND ABC.
C. Identify specific problems related to specific farm operations, decide upon a solution, and test and evaluate conclusions under actual or simulated job conditions.	ABC 1 2 3 4 5 6 7 8 9 0
5. To assist students in developing abilities to maintain,operate,and adjust farm power, machinery, and equipment.	
A. Direct study and discussion of the operation, maintenance,and adjustment of farm power, machinery, and equipment.	A 1 2 3 4 5 6 7 8 9 0
B. Provide actual experiences in the operation, adjustment, and maintenance of farm power,machinery, and equipment.	AB 1 2 3 4 5 6 7 8 9 0
C. Organize activities to develop understanding of scientific principles related to the operation of farm power,machinery, and equipment	ABC 1 2 3 4 5 6 7 8 9 0
6. To assist students in developing abilities essential to maintaining healthful and safe conditions on the farm and in the home.	
A. Direct study and discussion of health and safety practices. .	A 1 2 3 4 5 6 7 8 9 0
B. Organize activities, integrated with appropriate units, to improve health and safety practices in the classroom and shop	AB 1 2 3 4 5 6 7 8 9 0
C. Plan, develop, and carry out a long-range community program to improve health and safety practices on the farm and in the home. . . .	ABC 1 2 3 4 5 6 7 8 9 0

	ENCIRCLE THE SCORE YOU WOULD ASSIGN A SCHOOL OPERATING AT LEVELS A, AB, AND ABC.
7. To assist persons in exploring the redirection of agricultural patterns, practices, and concepts.	
A. Direct study and discussion of new agricultural patterns, practices, and concepts.	A 1 2 3 4 5 6 7 8 9 0
B. Demonstrate new agricultural patterns, practices, and concepts in the community	AB 1 2 3 4 5 6 7 8 9 0
C. Organize planning groups to implement new agricultural patterns, practices, and concepts .	ABC 1 2 3 4 5 6 7 8 9 0
8. To assist students in developing abilities essential for assuming leadership and citizenship roles.	
A. Direct study and discussion of knowledge and skills requisite for successful acceptance of leadership and citizenship roles	A 1 2 3 4 5 6 7 8 9 0
B. Organize and direct activities to provide experiences in leadership and citizenship responsibilities in the classroom and shop	AB 1 2 3 4 5 6 7 8 9 0
C. Plan, develop, and carry out projects to provide direct experiences in leadership and citizenship responsibilities in the school and community	ABC 1 2 3 4 5 6 7 8 9 0
9. To assist persons in understanding and interpreting the role of agriculture in society.	
A. Give talks, exhibit displays, and otherwise informally interpret agriculture to the school community.	A 1 2 3 4 5 6 7 8 9 0

	ENCIRCLE THE SCORE YOU WOULD ASSIGN A SCHOOL OPERATING AT LEVELS A, AB, AND ABC.
B. Organize an informal education program to interpret agriculture to the community	AB 1 2 3 4 5 6 7 8 9 0
C. Organize formal programs of instruction, for all age levels, to interpret agriculture to the community.	ABC 1 2 3 4 5 6 7 8 9 0
10. To assist students in developing mechanical skills, such as carpentry, welding, and cold metal work, involved in farm improvement and maintenance.	
A. Direct study and discussion of mechanical skills needed by farmers.	A 1 2 3 4 5 6 7 8 9 0
B. Direct the performance of mechanical skills in the shop. .	AB 1 2 3 4 5 6 7 8 9 0
C. Direct the application of skills under actual or simulated job conditions	ABC 1 2 3 4 5 6 7 8 9 0
11. To assist students in developing abilities to understand marketing processes and to market products and services profitably.	
A. Direct study and discussion of farm marketing processes and practices.	A 1 2 3 4 5 6 7 8 9 0
B. Analyze existing practices pertaining to marketing farm products and services	AB 1 2 3 4 5 6 7 8 9 0
C. Plan, develop, and carry out activities to provide practical experiences in marketing products and services	ABC 1 2 3 4 5 6 7 8 9 0
12. To assist students in developing non-mechanical (i.e., manipulative and identification) skills, such as pruning fruit trees, identifying weed seeds, and culling hens, involved in farm production and improvement.	

ENCIRCLE THE SCORE YOU WOULD ASSIGN A SCHOOL OPERATING AT LEVELS A, AB, AND ABC.

A. Direct study and discussion of manipulative and identification skills. . . . . A 1 2 3 4 5 6 7 8 9 0
B. Direct the performance of skills in laboratory, shop, classroom, or on a farm . . . . . AB 1 2 3 4 5 6 7 8 9 0
C. Direct the application of skills under actual or simulated job conditions . . . . . ABC 1 2 3 4 5 6 7 8 9 0

13. To assist persons in critically analyzing the economic requirements essential for establishing and maintaining efficient farming units.
A. Direct study and discussion of efficient farming units . . . A 1 2 3 4 5 6 7 8 9 0
B. Analyze and interpret farm records, and identify efficiency factors affecting farm income. . AB 1 2 3 4 5 6 7 8 9 0
C. Direct the application of criteria (i.e., efficiency factors) to help beginning or established farmers make independent judgments concerning the economic possibilities of specific farming units. . . . . ABC 1 2 3 4 5 6 7 8 9 0

14. To assist out-of-school youth and adults enter into and/or become more effectively established in farm-related occupations.
A. Organize and conduct formal programs of instruction to help persons become established in farm-related occupations . . . . A 1 2 3 4 5 6 7 8 9 0
B. Hold regular conferences with persons becoming established in farm-related occupations to help work out problems encountered in these occupations. . . . . AB 1 2 3 4 5 6 7 8 9 0

	ENCIRCLE THE SCORE YOU WOULD ASSIGN A SCHOOL OPERATING AT LEVELS A, AB, AND ABC.
C. Organize and conduct intensive and extensive technical courses at post high school levels.	ABC 1 2 3 4 5 6 7 8 9 0
15. To assist students in exploring the possibilities of employment in agricultural occupations.	
A. Direct study and discussion of general nature of agricultural occupations.	A 1 2 3 4 5 6 7 8 9 0
B. Survey the community to determine the types of and employment in agricultural occupations in the community	AB 1 2 3 4 5 6 7 8 9 0
C. Analyze the nature, training requirements, and current and future demands for agricultural workers at local, state, national, and global levels.	ABC 1 2 3 4 5 6 7 8 9 0
16. To assist persons in developing interests and abilities of an avocational nature (e.g.,aesthetic appreciations and leisure time activities, such as landscaping, gardening, and establishing lawns), related to agriculture.	
A. Discuss avocational problems and practices informally with persons in the school community.	A 1 2 3 4 5 6 7 8 9 0
B. Organize and conduct topical discussions, for informal group meetings, dealing with avocational abilities related to agriculture	AB 1 2 3 4 5 6 7 8 9 0
C. Plan, develop, and carry out instructional programs including special courses and club activities at all age levels, dealing with avocational aspects of agriculture.	ABC 1 2 3 4 5 6 7 8 9 0

	ENCIRCLE THE SCORE YOU WOULD ASSIGN A SCHOOL OPERATING AT LEVELS A, AB, AND ABC.
17. To assist high school students in formulating realistic occupational goals.	
A. Encourage students who express verbal interest in agriculture to prepare for an agricultural occupation.	A 1 2 3 4 5 6 7 8 9 0
B. Determine levels of aptitude and interest in agricultural occupations.	AB 1 2 3 4 5 6 7 8 9 0
C. Provide try-out and directed work experiences in agricultural occupations.	ABC 1 2 3 4 5 6 7 8 9 0
18. To assist students in developing an appreciation for the place of agriculture in the emerging pattern of American society.	
A. Direct study and discussion of the cultural patterns of rural communities.	A 1 2 3 4 5 6 7 8 9 0
B. Examine the similarities and differences of cultural patterns in rural and urban communities .	AB 1 2 3 4 5 6 7 8 9 0
C. Organize learning experiences to inculcate better understanding between rural and urban groups .	ABC 1 2 3 4 5 6 7 8 9 0
19. To assist out-of-school youth and adults enter into and/or become more effectively established in farming.	
A. Organize and conduct formal programs of instruction to help persons become established in farming.	A 1 2 3 4 5 6 7 8 9 0
B. Hold regular conferences with persons becoming established in farming to plan farming operations.	AB 1 2 3 4 5 6 7 8 9 0
C. Organize and conduct advanced intensive and extensive technical courses, at post high school levels	ABC 1 2 3 4 5 6 7 8 9 0

	ENCIRCLE THE SCORE YOU WOULD ASSIGN A SCHOOL OPERATING AT LEVELS A, AB, AND ABC.
20. To assist students in developing abilities to organize land, labor, and capital resources into an efficient producing unit.	
A. Direct study and discuss the theories and practices of farm organization, including farm and soil management, finances, records, and utilization of land resources.	A 1 2 3 4 5 6 7 8 9 0
B. Analyze existing farm operations, and outline alternate patterns of farm organization . . .	AB 1 2 3 4 5 6 7 8 9 0
C. Plan, develop, and carry out systematic projects to provide practical experience in organizing the land, labor, and capital resources on a farm	ABC 1 2 3 4 5 6 7 8 9 0
21. To assist high school students in obtaining employment in appropriate agricultural occupations	
A. Direct study and discussion of placement opportunities in the community.	A 1 2 3 4 5 6 7 8 9 0
B. Survey the community to locate placement opportunities . .	AB 1 2 3 4 5 6 7 8 9 0
C. Assist students in obtaining employment in jobs which utilize particular competencies possessed by students.	ABC 1 2 3 4 5 6 7 8 9 0
22. To assist students in developing abilities to procure and utilize efficiently equipment, supplies, and services.	
A. Direct study and discussion of procurement of farm equipment, supplies, and services	A 1 2 3 4 5 6 7 8 9 0
B. Analyze existing practices pertaining to procuring and utilizing equipment, supplies, and services	AB 1 2 3 4 5 6 7 8 9 0

	ENCIRCLE THE SCORE YOU WOULD ASSIGN A SCHOOL OPERATING AT LEVELS A, AB, AND ABC.
C. Plan, develop, and carry out projects to provide practical experience in procuring and utilizing equipment, supplies, and services.	ABC 1 2 3 4 5 6 7 8 9 0
23. To assist persons established in farming in adjusting to changing occupational conditions in farming.	
A. Organize and conduct formal programs of instruction to help persons, established in farming, adjust to changing agricultural conditions	A 1 2 3 4 5 6 7 8 9 0
B. Hold regular conferences with persons established in farming to plan farming operations.	AB 1 2 3 4 5 6 7 8 9 0
C. Organize and conduct advanced intensive and extensive technical courses, at post high school levels.	ABC 1 2 3 4 5 6 7 8 9 0
24. To assist academically talented students in preparing for education beyond the high school level.	
A. Counsel informally with academically talented students and encourage them to intensify their educational efforts.	A 1 2 3 4 5 6 7 8 9 0
B. Provide enriched experiences within regular course offerings, to challenge academically competent students.	AB 1 2 3 4 5 6 7 8 9 0
C. Provide advanced courses in agricultural science for prospective college students	ABC 1 2 3 4 5 6 7 8 9 0

	ENCIRCLE THE SCORE YOU WOULD ASSIGN A SCHOOL OPERATING AT LEVELS A, AB, AND ABC.
25. To assist students in developing an understanding of scientific knowledge, concepts, and methods related to agriculture.	
A. Direct study and discussion of the nature of scientific thought and practice	A 1 2 3 4 5 6 7 8 9 0
B. Develop projects to apply products of scientific practice and thought.	AB 1 2 3 4 5 6 7 8 9 0
C. Create and design experiments to add to the fund of scientific knowledge.	ABC 1 2 3 4 5 6 7 8 9 0

PURDUE UNIVERSITY
DIVISION OF EDUCATION

Vocational Education Research Project
Cooperative Project No. 385 (7784)

Form 14

APPRAISAL OF OPERATIONAL LEVELS
INDUSTRIAL EDUCATION

DIRECTIONS:

This instrument contains a list of 23 purposes of industrial education, and for each purpose, a series of three statements describing levels of operations appropriate for attaining the purpose. The three statements are designated as Levels A, B, and C.

We would like for you to appraise the relative importance of each level of operation for each purpose. After you have read the purposes and the three statements, indicate on a scale of 1 to 10 the value you would assign a school operating at Level A (only) by encircling a number on the scale to the right of statement "A". Then indicate the value you would assign a school operating at Levels A plus B, and encircle the number at the right of statement "B". Thirdly, indicate the value you would assign a school operating at Levels A plus B plus C, and encircle the number at the right of statement "C". Assume, in your ratings, that the school is operating effectively at each appropriate level.

Please note that the effect of your ratings will be cumulative, and the differentials in ratings represent the increments you would add to a school's score for each additional level of operation. The following example demonstrates the procedure:

Purpose: To assist students in developing laboratory skills.

A. Direct study and discussion of laboratory skills.	A 1 (2) 3 4 5 6 7 8 9 0
B. Demonstrate laboratory skills in the classroom or laboratory	AB 1 2 3 4 (5) 6 7 8 9 0
C. Direct students in actual performance of laboratory skills through experiments and projects.	ABC 1 2 3 4 5 6 7 8 9 (0)

The above ratings indicate that the rater assigned a relatively low score to discussion of skills and only a modest increment for demonstration, although he rated demonstration higher than discussion. His greatest increment is reserved for schools which provide actual experience in developing laboratory skills.

	ENCIRCLE THE SCORE YOU WOULD ASSIGN A SCHOOL OPERATING AT LEVELS A, AB, AND ABC.
C. Organize formal instruction programs, such as adult classes in woodworking, related to the avocational aspects of industrial education.	ABC 1 2 3 4 5 6 7 8 9 0
8. To assist high school students in formulating realistic occupational goals.	
A. Encourage students who express verbal interest in industrial occupations to prepare for them	A 1 2 3 4 5 6 7 8 9 0
B. Determine levels of aptitude and interest in industrial occupations.	AB 1 2 3 4 5 6 7 8 9 0
C. Provide try-out and directed work experiences in industrial occupations.	ABC 1 2 3 4 5 6 7 8 9 0
9. To assist persons established as an industrial worker in adjusting to changing needs, goals, and opportunities in industrial occupations.	
A. Organize and conduct programs of instruction to prepare adults for new or different occupations	A 1 2 3 4 5 6 7 8 9 0
B. Hold regular conferences with employed workers to assist them in analyzing aptitudes and interests and in planning individual retraining programs	AB 1 2 3 4 5 6 7 8 9 0
C. Organize and conduct intensive or extensive courses at post high school levels	ABC 1 2 3 4 5 6 7 8 9 0
10. To assi t currently employed workers in upgrading their level of occupational proficiency.	
A. Organize and conduct programs of instruction to help industrial workers upgrade their occupational level	A 1 2 3 4 5 6 7 8 9 0

The purposes and operational levels were constructed after an analysis of trends and opinions related to vocational education. The basic data is given in the enclosed brochure entitled, "An Abstract of the Analysis of Social, Economic, and Technical Trends and Opinions Related to Vocational Education." Since we are concerned with obtaining ratings of operational levels in terms of the types of educational programs that should be offered if schools are to reflect contemporary conditions and trends of society, it is desirable that the brochure be consulted briefly prior to rating the levels of operations.

Please return the completed instrument in the self-addressed, stamped envelope provided for this purpose. Your cooperation is greatly appreciated.

Frank J. Woerdehoff
Norbert J. Nelson
John K. Coster

Note: The brochure may be retained for your files. If you desire a copy of this instrument for your own use, please request, Appraisal of Operational Levels, Industrial Education.

	ENCIRCLE THE SCORE YOU WOULD ASSIGN A SCHOOL OPERATING AT LEVELS A, AB, AND ABC.
1. To assist students in developing an appreciation for the social significance of the "world of work."	
A. Direct study and discussion of the social contributions of the industrial worker to society	A 1 2 3 4 5 6 7 8 9 0
B. Direct study and analysis of the possibilities for horizontal and vertical advancement in industrial occupations	AB 1 2 3 4 5 6 7 8 9 0
C. Direct study and analysis of the interrelationship between industry and society as a whole.	ABC 1 2 3 4 5 6 7 8 9 0

	ENCIRCLE THE SCORE YOU WOULD ASSIGN A SCHOOL OPERATING AT LEVELS A, AB, AND ABC.
2. To assist students in developing an understanding of related technical knowledge and information pertaining to industrial occupations.	
A. Direct study and discussion of related technical knowledge .	A 1 2 3 4 5 6 7 8 9 0
B. Plan, develop, and carry out projects to provide experience in relating technical knowledge to industrial processes and operations	AB 1 2 3 4 5 6 7 8 9 0
C. Create and design experiments to add to the fund of technical knowledge.	ABC 1 2 3 4 5 6 7 8 9 0
3. To assist students in developing the ability to select, care for, and use industrial products wisely.	
A. Study and discuss consumer information in general	A 1 2 3 4 5 6 7 8 9 0
B. Develop criteria on which to base selection of industrial products.	AB 1 2 3 4 5 6 7 8 9 0
C. Examine products and compare with established criteria. . . .	ABC 1 2 3 4 5 6 7 8 9 0
4. To assist students in developing identification skills, such as identifying woods, metals, tools, and parts of equipment, involved in industrial processes.	
A. Direct study and discussion of industrial skills	A 1 2 3 4 5 6 7 8 9 0
B. Direct the performance of skills in the shop	AB 1 2 3 4 5 6 7 8 9 0
C. Direct the application of skills under actual or simulated job conditions	ABC 1 2 3 4 5 6 7 8 9 0

ENCIRCLE THE SCORE YOU WOULD ASSIGN A SCHOOL OPERATING AT LEVELS A, AB, AND ABC.

5. To assist students in developing an appreciation for and an understanding of technological developments in industrial processes
   A. Direct study and discussion of technological developments in industrial occupations . . . . . A 1 2 3 4 5 6 7 8 9 0
   B. Survey the community to ascertain the extent to which technological developments have been put to use . . . . . AB 1 2 3 4 5 6 7 8 9 0
   C. Design applications of technological developments to industrial processes. . . . . ABC 1 2 3 4 5 6 7 8 9 0

6. To assist students in developing an appreciation for high standards of workmanship.
   A. Direct study and discussion of good work habits emphasizing planning of work and quality of performance. . . . . A 1 2 3 4 5 6 7 8 9 0
   B. Plan, develop, and carry out projects to develop high standards of workmanship. . . . . AB 1 2 3 4 5 6 7 8 9 0
   C. Measure performance against criteria of satisfactory workmanship typically used in industrial occupations. . . . . ABC 1 2 3 4 5 6 7 8 9 0

7. To assist persons in developing interests and abilities of an avocational nature, such as may be utilized in hobbies and home repair, which are related to industrial occupations.
   A. Study and discuss the avocational aspects of industrial occupations. . . . . A 1 2 3 4 5 6 7 8 9 0
   B. Conduct informal instruction programs such as clubs and activities related to the avocational aspects of industrial occupations. . . . . AB 1 2 3 4 5 6 7 8 9 0

	ENCIRCLE THE SCORE YOU WOULD ASSIGN A SCHOOL OPERATING AT LEVELS A, AB, AND ABC.
B. Hold regular conferences with employed workers to assist in analyzing aptitudes and interests and in planning individual upgrading programs.	AB 1 2 3 4 5 6 7 8 9 0
C. Organize and conduct intensive or extensive technical courses at post high school levels	ABC 1 2 3 4 5 6 7 8 9 0
11. To assist students in developing abilities essential to maintaining healthful and safe conditions on the job.	
A. Direct study and discussion of health and safety practices. .	A 1 2 3 4 5 6 7 8 9 0
B. Organize learning experiences, integrated with appropriate classes to improve health and safety practices in the classroom and shop.	AB 1 2 3 4 5 6 7 8 9 0
C. Plan, develop, and carry out long-range programs to improve health and safety practices on the job and in the community. . .	ABC 1 2 3 4 5 6 7 8 9 0
12. To assist students in developing traits such as initiative, cooperation, and resourcefulness, essential for successful occupational adjustments and human relations.	
A. Direct study and discussion of personal traits essential for successful adjustment in industrial occupations	A 1 2 3 4 5 6 7 8 9 0
B. Provide individual counseling services to assist students in self-analysis and self-improvement.	AB 1 2 3 4 5 6 7 8 9 0
C. Plan, develop, and carry out group activities to develop traits essential for occupational success	ABC 1 2 3 4 5 6 7 8 9 0

	ENCIRCLE THE SCORE YOU WOULD ASSIGN A SCHOOL OPERATING AT LEVELS A, AB, AND ABC.
13. To assist students in exploring the possibilities of employment in industrial occupations.	
A. Direct study and discussion of the general nature of industrial occupations.	A 1 2 3 4 5 6 7 8 9 0
B. Survey the community to determine the types of, and employment in, industrial occupations.	AB 1 2 3 4 5 6 7 8 9 0
C. Analyze the nature, training requirements, and current and future demands for industrial workers at local, state, national, and global levels.	ABC 1 2 3 4 5 6 7 8 9 0
14. To assist students in developing competencies in understanding and utilizing scientific concepts and methods involved in industrial processes.	
A. Direct study and discussion of the nature of scientific thought and practice	A 1 2 3 4 5 6 7 8 9 0
B. Plan, develop, and carry out projects to provide experiences in applying the products of scientific thought and practice . . .	AB 1 2 3 4 5 6 7 8 9 0
C. Create and design experiments to add to the fund of scientific knowledge	ABC 1 2 3 4 5 6 7 8 9 0
15. To assist academically talented students in preparing for education beyond high school.	
A. Direct study and discussion of opportunities in industrial occupations requiring education beyond high school	A 1 2 3 4 5 6 7 8 9 0
B. Provide enriched experiences, within regular course offerings, to challenge academically competent students.	AB 1 2 3 4 5 6 7 8 9 0

	ENCIRCLE THE SCORE YOU WOULD ASSIGN A SCHOOL OPERATING AT LEVELS A, AB, AND ABC.
C. Provide advanced courses in industrial education permitting academically talented students to exercise their creative imagination	ABC 1 2 3 4 5 6 7 8 9 0
16. To assist students in developing an appreciation of the economic contributions of industrial workers to society.	
A. Direct study and discussion of the economic importance of industrial occupations	A 1 2 3 4 5 6 7 8 9 0
B. Plan, develop, and carry out projects to determine the economic importance of industrial occupations in the community . . .	AB 1 2 3 4 5 6 7 8 9 0
C. Direct the examination and analysis of data from local, state, and national sources to determine present and future importance of the economic contributions of industrial occupations.	ABC 1 2 3 4 5 6 7 8 9 0
17. To assist persons in creating a favorable attitude toward industrial occupations and education in the community.	
A. Give talks, exhibit displays, or otherwise informally interpret industrial occupations and education to the school and community.	A 1 2 3 4 5 6 7 8 9 0
B. Organize an informal education program, using a variety of communication media, to interpret industrial occupations and education in the community. . . .	AB 1 2 3 4 5 6 7 8 9 0
C. Organize formal programs f instruction, for all age levels, designed to interpret industrial occupations and education to the community.	ABC 1 2 3 4 5 6 7 8 9 0

	ENCIRCLE THE SCORE YOU WOULD ASSIGN A SCHOOL OPERATING AT LEVELS A, AB, AND ABC.
18. To assist students in developing basic operational skills that apply to a wide range of industrial occupations and education to the community.	
A. Direct the performance of hand operations essential for employment in a variety of occupations.	A 1 2 3 4 5 6 7 8 9 0
B. Direct the performance of mechanical operations essential for employment in a variety of occupations.	AB 1 2 3 4 5 6 7 8 9 0
C. Direct an analysis of basic operational skills, and assist in developing understandings of their applications to a variety of occupations by providing actual or simulated job conditions.	ABC 1 2 3 4 5 6 7 8 9 0
19. To assist students in developing abilities essential for leadership and citizenship roles.	
A. Direct study and discussion of the knowledge and skills required for successful acceptance of leadership and citizenship roles.	A 1 2 3 4 5 6 7 8 9 0
B. Plan, develop, and carry out activities to provide experiences in leadership and citizenship responsibilities in the classroom and shop	AB 1 2 3 4 5 6 7 8 9 0
C. Plan, develop, and carry out projects to provide direct experiences in leadership and citizenship responsibilities in the school and community	ABC 1 2 3 4 5 6 7 8 9 0

	ENCIRCLE THE SCORE YOU WOULD ASSIGN A SCHOOL OPERATING AT LEVELS A, AB, AND ABC.
20. To assist students in developing abilities to form sound judgments and solve problems related to industrial processes. A. Direct study and discussion of typical problems pertaining to simple industrial processes. . . B. Plan, develop, and carry out projects, with specific instructions, to provide experiences in working out problems involved in industrial processes . . . . . . C. Plan, develop, and carry out projects in actual or simulated job conditions to provide experiences in creating solutions to problems related to industrial processes.	A 1 2 3 4 5 6 7 8 9 0 AB 1 2 3 4 5 6 7 8 9 0 ABC 1 2 3 4 5 6 7 8 9 0
21. To assist students in developing an appreciation and an understanding of labor-management relationships. A. Direct study and discussion of labor-management relations. . B. Plan, develop, and carry out surveys of the community to determine labor-management problems C. Structure simulated problems in labor-management relationships to provide experiences in arriving at possible solutions. . . .	A 1 2 3 4 5 6 7 8 9 0 AB 1 2 3 4 5 6 7 8 9 0 ABC 1 2 3 4 5 6 7 8 9 0
22. To assist students in developing specific operational skills essential for initial employment in a specific occupation. A. Direct the performance of the hand operations essential for employment in specific occupations. B. Direct the performance of the mechanical operations essential for employment in specific occupations	A 1 2 3 4 5 6 7 8 9 0 AB 1 2 3 4 5 6 7 8 9 0

	ENCIRCLE THE SCORE YOU WOULD ASSIGN A SCHOOL OPERATING AT LEVELS A, AB, AND ABC.
C. Direct an analysis of the basic operational skills and develop an understanding of their application to industrial occupations by providing actual or simulated job conditions.	ABC 1 2 3 4 5 6 7 8 9 0
23. To assist high school students in obtaining employment in appropriate industrial occupations. A. Direct study and discussion of the placement opportunities in the community.	A 1 2 3 4 5 6 7 8 9 0
B. Plan, develop, and carry out surveys of the community to locate placement opportunities . .	AB 1 2 3 4 5 6 7 8 9 0
C. Assist students in obtaining employment in jobs which utilize particular competencies possessed by the students	ABC 1 2 3 4 5 6 7 8 9 0

APPENDIX B

LETTERS

SAMPLE LETTER SENT TO POTENTIAL MEMBERS OF JURY I*

PURDUE UNIVERSITY
School of Science, Education, and Humanities
Division of Education
LAFAYETTE, INDIANA

Department of Education

This letter solicits your participation in a study of vocational education in public schools, being conducted by Purdue University in cooperation with the Research Section of the U. S. Office of Education.

Specifically, we are inviting you to serve as a member of a jury to rate the importance of twenty-five purposes of vocational agriculture in terms of the extent to which these purposes reflect contemporary social, economic, and technical trends in modern American society. (The results of an analysis of trends, conducted as a preliminary step in the present study, will be mailed to all persons who agree to participate in the study.)

Educators who are recognized nationally in one or more of three fields, namely, school administration, curriculum development, or agricultural education, are being contacted and invited to participate in the study. A brief abstract of the outline of the study is being enclosed to inform you more fully about the nature of the project.

Upon receipt of the self-addressed card, indicating your willingness to participate in the study, a rating instrument and the results of the analysis of trends will be mailed to you immediately. Your attention to this request, and your assistance as a member of the jury, will be greatly appreciated.

Sincerely yours,

Frank J. Woerdehoff
Norbert J. Nelson
John K. Coster
Project Directors
Cooperative Project No. 385

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*Similar letters were mailed to potential members of Juries II, III, and IV.

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FOLLOW-UP LETTER SENT TO POTENTIAL MEMBERS OF JURY I*

PURDUE UNIVERSITY
School of Science, Education, and Humanities
Division of Education
LAFAYETTE, INDIANA

Department of Education

A letter was mailed to you recently inviting you to serve as a member of a jury to rate purposes of Vocational Agriculture. This rating procedure is part of a study entitled "Vocational Education in Public Schools as Related to Social, Economic, and Technical Trends," and is being financed, in part, by a contract with the Research Section of the U. S. Office of Education. Persons contacted to serve on the jury were asked to return a postal card indicating whether they would or would not participate in the study.

Rather than send a follow-up letter to persons who have not returned a card, we have decided to send the copy of the rating instrument, together with a copy of a publication entitled "An Abstract of the Analysis of Social, Economic, and Technical Trends and Opinions Related to Vocational Education." The publication, which you may retain for your files, was designed to serve as a guide to rating the items in the rating scale.

Cards and ratings have been received from a large number of educators in the fields contacted -- including school administration, curriculum specialists, and vocational educators, and we would be most appreciative if you would agree to serve as a member of the jury by filling out and returning the enclosed rating instrument.

Sincerely yours,

Frank J. Woerdehoff
Norbert J. Nelson
John K. Coster
Project Directors
Cooperative Project No. 385

Enclosure: Abstract, Instrument

*Similar follow-up letters were sent to potential members of Juries II, III, and IV.

SAMPLE LETTER SENT TO HIGH SCHOOL PRINCIPALS TO INVITE THEM TO PARTICIPATE IN THE STUDY

PURDUE UNIVERSITY
School of Science, Education, and Humanities
Division of Education
LAFAYETTE, INDIANA

Department of Education

Mr. _____, Principal

_____ High School

_____, Indiana

Dear Mr. _____

This letter solicits your cooperation in a research project being conducted jointly by the U. S. Office of Education and the Department of Education of Purdue University. Basically the research is concerned with analyzing vocational agricultural, industrial arts, and trade and industrial education programs in order to determine the extent to which such programs are related realistically to the social, economic, and technical trends emerging in American culture.

In keeping with accepted research procedures, we have selected 84 schools operating programs in one or more of the above areas which would be visited during the months of March and April of 1959. Your school is among this selected group.

The research will in no way identify your school in the findings. If at a later date you desire specific information about your school's education programs, such confidential information will be made available to you upon request. Schools participating in the study will receive a copy of the completed research project.

If you agree to participate in this study, a check list to be used in the analysis of _____* programs will be sent to you in advance. To collect the data, a trained interviewer will visit your school to confer with you and the teachers involved in the programs being studied. A date convenient to you will be arranged for the visit at a later time.

A postal card is enclosed with this letter for your convenience to indicate your willingness to participate in this research. Immediate attention to this matter will be greatly appreciated.

Sincerely yours,

Frank J. Woerdehoff
Norbert J. Nelson
John K. Coster
Project Directors
Cooperative Project No. 385

WNC/ lch

Enc.: Abstract

cc: _____, Superintendent of Schools

*The program or programs to be studied were designated here.

FOLLOW-UP LETTER SENT TO PRINCIPAL WHO DID NOT REPLY
TO ORIGINAL LETTER

PURDUE UNIVERSITY
School of Science, Education, and Humanities
Division of Education
LAFAYETTE, INDIANA

Department of Education

During the first week in February, we mailed a letter to you soliciting your cooperation in a research project being conducted jointly by the U. S. Office of Education and the Department of Education of Purdue University. A postal card was enclosed in the letter for your convenience to indicate your willingness to participate in the research. To date, we have not received the postal card.

We do not wish to inconvenience you by attempting to hurry your decision; however, we shall greatly appreciate your helping us to meet our deadline by returning the enclosed card as soon as possible.

Sincerely yours,

Frank J. Woerdehoff
Norbert J. Nelson
John K. Coster
Project Directors
Cooperative Project No. 385

Enc.: Postal Card
Abstract

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SAMPLE LETTER MAILED TO HIGH SCHOOL PRINCIPAL PRIOR TO VISIT

PURDUE UNIVERSITY
School of Science, Education, and Humanities
Division of Education
LAFAYETTE, INDIANA

Department of Education

We appreciate your willingness to participate in the Vocational Education Research Project, being conducted by the Division of Education of Purdue University in cooperation with the U. S. Office of Education.

Enclosed are _____ forms which we would like for you to complete prior to our visit. One form is entitled "General Information Survey," and is to be completed by the high school principal. The other form or forms are to be used in an analysis of purposes of vocational agriculture and/or purposes of industrial education, whichever is applicable in your school. The analysis of purposes of vocational agriculture is to be accomplished jointly by the high school principal, the vocational coordinator or director, where one is employed, and the vocational agriculture teacher. The analysis of purposes of industrial education is to be accomplished jointly by the high school principal, vocational director or coordinator, where one is employed, and industrial education teacher(s) (including both industrial arts and trade and industrial education teachers, where both programs are offered).

We would appreciate it if you would hold these forms in your office after they are completed, and we shall pick them up during our visit.

Sincerely yours,

Wilmer K. Bugher
Research Associate
Cooperative Project 385

WKB/ lch

Enc.: General Information Survey (Form 2)

APPENDIX C

ABSTRACT

VOCATIONAL EDUCATION IN PUBLIC SCHOOLS AS RELATED TO SOCIAL, ECONOMIC, AND TECHNICAL TRENDS

ABSTRACT

The study entitled "Vocational Education in Public Schools as Related to Social, Economic, and Technical Trends" involves (1) formulating desirable characteristics of vocational education based on an analysis of contemporary social, economic, and technical conditions and trends, and (2) conducting a study of a sample of Indiana high schools to identify factors related to the desirable characteristics.

A list of major social, economic, and technical conditions and trends are to be prepared, and the trends in the list are to be ranked in terms of potential influence on vocational education. Raters are to include specialists in sociology, economics, and education. The trends, so ranked, are to serve as bases for preparing lists of desirable purposes, resources, and operational procedures for the selected fields of vocational agriculture, vocational industrial education, and industrial arts. The desirable characteristics are to be evaluated by educational specialists (school administrators, general educators, vocational educators), and from the evaluations check lists are to be constructed to be used in surveying existing programs of vocational education.

A sample of approximately 84 high schools, representing three discrete size groups, is to be selected. The schools are to be surveyed, and, from items checked on the check lists, status scores are to be computed for each category-field-school (e.g., purposes of vocational agriculture in School X). The status scores are then to be used to determine inter-relationship among purposes, resources, and operational procedures, for each of the two selected fields. Further statistical analyses are to be made to ascertain the relationship of factors such as school size and revenues expended for vocational education and status scores.

All data -- including those collected in the analysis of trends, the evaluation of desirable characteristics, the computation of status scores, the determination of inter-relationships, and the identification of factors related to status scores -- then will be synthesized and analyzed to evaluate the efficacy of existing patterns and programs of vocational education, to determine changes that should be made in vocational programs in the selected fields, and to identify additional research problems.